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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Chemical Information Division of the Office of Pesticides and Toxic Substances, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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80-1801. Ahnoff, M.; Eklund, G.; Josefesson, B. (Dep. Anal. Chem., Univ. Gothenburg, Goteborg, Sweden) **Analysis of PCB in water from the Swedish west coast.** *Acta Hydrochim. Hydrobiol.* 7(2): 171-178; 1979 (12 references).

Gota River and Goteborg coastal waters and costal sediment were sampled and analyzed for PCBs. An analysis procedure was designed to extract the PCBs from the water and sediment samples. An *in situ* extractor was used at the sampling sites to ensure that the compounds of interest would be adequately sampled. Clean-up procedures were performed to remove interference from elemental sulfur. To identify DDT and DDE reference peaks, gas chromatography with electron capture detection was performed and mass fragmentography was then used to identify isotopic clusters of 5 chlorine PCBs and give information of the presence of 11 different PCB isomers. Concentrations of PCBs in Swedish waters ranged from 1 ng/l in Goteborg harbor waters to < 0.1 ng/l in a north coastal fjord.

80-1802. Kratka, J.; Lucny, M.; Ujevic, I. (State Inst. Plant Prot., Prague, Czechoslovakia) **Vliv pesticidu na nektere metabolicke procesy a technologickou jakost psenice. [Effect of pesticides on some metabolic processes and technological characteristics of wheat.]** *Agrochemia* 20(2): 53-57; 1980 (24 references) (Czech).

Cultures of Czechoslovakian wheat seed stock, varieties Mironovska, Jubilar and Kavkaz, were grown from seeds dipped in Hermal (thiram), Vitavax (carboxin) + Hermal, NF (thiram + thiophanate), Quinolate (oxyquinolate + carboxin) and Vorinit (fuberidazole + hexachlorobenzene). During the vegetative period the wheat was treated with the herbicides Retacel (chlormequat), Keropur (MCPA + dicamba + benazolin) and Dicuran (chlortoluron) and the harvests were stored for 6 mo. Germination tests were performed and grains germinating for 3 days were tested for direct oxygen absorption, catalasic and peroxidasic activity, reducing sugar content and nitrogen content. Milling and baking tests were performed including kneading tests, dough rising and baking time. The results were then compared with results obtained from grain grown from undipped seedstock treated with herbicides and from undipped and untreated grain and the results were tabulated. Some differences were noted attributable both to the different treatments and strains but flour quality and technological characteristics were unaffected.

80-1803. Anonymous **Institut za medicinska istrazivanja i medicinu rada u Zagrebu. Izvjestaj o radu u 1978. Godini. [Institute of industrial medicine and occupational medicine at Zagreb. Report of work done in 1978.]** *Arh. Hig. Rada Toksikol.* 30(1): 71-134; 1979 (139 references) (Serbo-Croatian).

The 1978 activity of the Zagreb Institute of Medical Research and Occupational Medicine, including studies on the effects of pesticides on human and animal health, is reviewed. Metriphonate (trichlorfon) was not found to be mutagenic in experimental animals. Objective ophthalmological examinations failed to reveal any pathological changes in 16 workers with subjective symptoms (photophobia and lacrimation), who have been exposed to various pesticides for 2-20 yr. The *p,p'*-DDE levels found were 31 ppb in human milk, 18 ppb in the serum of pregnant women, and 6.8 ppb in placental blood serum. The *p,p'*-DDD (*p,p'*-TDE) levels found were 11 ppb in human milk, 5.5 ppb in maternal blood serum, and 5.5 ppb in placental blood serum. Urine samples from 18 workers exposed occupationally to malathion were analyzed. O,O-dimethyl-S-methyldithiophosphate was found in 12 of 18 samples.

80-1804. Anonymous **Nitric oxide (NO) and nitrogen dioxide (NO_2) emissions from herbicide treated soybean plants.** *Atmos. Environ.* 13(10): 1475; 1979 (5 references).

A discussion is presented of previously published work on the emission of NO and NO_2 from herbicide-treated soybean plants. Data indicate that soybean plants emit NO and NO_2 into the atmosphere following herbicide exposure, confirming speculation that plants can contribute to ambient concentrations of NO and NO_2. It is suggested that the work needs to be verified and expanded to determine whether conditions other than herbicide treatment stimulate NO_x emissions into the atmosphere, and whether biogenic NO_x could participate in atmospheric photochemical reactions.

80-1805. Green, M. B. (Imperial Chem. Ind. Ltd., Runcorn, Cheshire, England) **The energy balance of pesticide use.** *Biologist (Phi Sigma Soc.)* 26(3): 123-126; 1979 (12 references).

In this overview, the question of whether the food energy obtained by the use of pesticides justifies the amounts of fossil fuel energy used in their production and application is discussed. From 1955-1975 in the United Kingdom there was a 75% increase in agricultural production despite the loss of more than one million hectares of arable land and a halving of the agricultural work force. The factors, including pesticides, which are responsible for the increasing yield per man-hour of metabolically utilizable food energy are discussed. The total energy inputs for 21 pesticides (insecticides, herbicides and fungicides) are presented. These figures represent both direct input (heat and electricity used in processing) and indirect input (intrinsic energies of the hydrocarbon feedstocks used in their manufacture). It is concluded that in the United Kingdom, the total amount of fossil fuel involved in pesticides manufacture and application is only about 0.04% of the total energy used by the nation. Examples of the crop losses prevented or the yield increases

obtained by the use of pesticides are presented, and it is concluded that the manufacture and use of pesticides is an efficient way to utilize fossil fuel energy.

80-1806. Boldt, P. F. (Michigan State Univ., East Lansing, MI) **Fate and selectivity of phenoxy-phenoxy herbicides in plants.** *Diss. Abstr. Int. B* 40(10): 4585; 1980.

The response of selected annual grass and broadleaf species to HOE 29152 and diclofop-methyl and the selectivity mechanisms of foliar applications of diclofop-methyl were studied. Retention, absorption, translocation and volatility of foliarly applied diclofop-methyl were compared in barnyard grass, proso millet, longspine sandbur, soybean, and cucumber. On a μg/plant basis, the order of diclofop-methyl retention was cucumber > soybean > proso millet > longspine sandbur = barnyard grass. On a μg/mg dry wt basis, proso millet retained 3-10 times more diclofop-methyl than all other species. One day after treatment (DAT) absorption of ^{14}C diclofop-methyl was 14-18% less in longspine sandbur than the other species, 3 DAT absorption in cucumber was 8-14% greater than the other species, and 5 DAT absorption in soybean was 3-12% less than the other species. Translocation of ^{14}C diclofop-methyl did not differ among species with 98% of the applied radioactivity located in the treated leaf. Differences in retention and absorption of diclofop-methyl were not related to selectivity. In metabolism studies, more than 95% of the radioactivity, washed from the leaf surface from all species, was diclofop-methyl. Plant extracts contained diclofop-methyl, diclofop and water soluble conjugates with higher levels of diclofop-methyl and diclofop being found in barnyard grass, proso millet and soybean. Acid hydrolysis of the water soluble conjugates yielded high amounts of diclofop in barnyard grass and proso millet, and high amounts of ring-OH diclofop in longspine sandbur, soybean and cucumber. Alkaline hydrolysis of the nonextracted plant residue yielded diclofop as the major component in all species. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8006085)

80-1807. Woldetatios, T. (Univ. Wisconsin, Madison, WI) **Effects of bentazon, diclofop, and bentazon + diclofop on annual weed control in soybeans, *Glycine max* (L.) Merr.** *Diss. Abstr. Int. B* 40(10): 4589-4590; 1980.

Bentazon was applied as a tank mix with diclofop-methyl in order to control both grass and broadleaf weeds with one spraying operation. However, bentazon + diclofop-methyl tank mix applications frequently induced soybean leaf toxicity and simultaneously provided poorer grass weed control than diclofop-methyl alone. Results demonstrated that the soybean leaf injury, observed from tank mix application of bentazon (1.12 kg/ha) with diclofop-methyl (1.68 kg/ha), could be reduced by delaying diclofop-methyl application to day 4 after the soybean first trifoliate stage with bentazon application 2-3 days prior to or after diclofop-methyl. Greenhouse studies further confirmed that single applications of diclofop-methyl were superior in decreasing height and weight of corn, oats and yellow foxtail than the tank mix application of the 2 herbicides. When bentazon and diclofop-methyl mixtures were sprayed on oat and soybean seedlings in the greenhouse, the results showed that diclofop-methyl + bentazon at 1.12 + 0.84 kg/ha reduced oat weight significantly while causing little injury to soybean leaves. The relative order of Hill reaction inhibition was bentazon + diclofop-methyl > bentazon > diclofop-methyl in both corn and soybean chloroplasts. Increased soybean leaf injury from tank mix application of the two herbicides may be due to the increased uptake of bentazon by the soybean leaves. Autoradiography studies showed no significant translocation differences of the labeled compounds among the seedlings regardless of the commercial herbicide pretreatments. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8007338)

80-1808. Miriamma-Jacob; Prabhu, V. K. K. (Dep. Zool., Univ. Kerala, Kariavattom, Trivandrum 695 581, India) **Effect of two juvenile hormone analogs on embryonic neuroendocrine system of *Dysdercus cingulatus* (Heteroptere: Pyrrhocoridae).** *Entomon* 4(2): 205-208; 1979 (8 references).

Studies were designed to determine the changes in endocrine organs as a result of treating eggs of *Dysdercus cingulatus* with juvenile hormone (JH) analogues. The JH analogues farnesyl methyl ether (FME) and ZR777 (kinoprene) were applied topically to eggs after oviposition, after germ band formation, and after blastokinesis. The various doses of FME (2.0, 1.5, 1.0, 0.5, and 0.25 μg) and ZR777 (0.25, 0.125, 0.06, 0.03, 0.015, 0.0075, 0.004, 0.0009 and 0.0001 μg) were dissolved in 1 μl of acetone. Embryos were fixed in Smith's fluid, sectioned, and examined microscopically. In eggs treated just after oviposition and after germ band formation, different types of abnormal embryos developed (non-segmented embryos, dwarf embryos). Eggs treated after blastokinesis were less sensitive. Among the abnormalities observed were clumping together of neurosecretory material in the cells, absence of reduction in size of the corpora cardiaca and corpus allatum, and absence of or degeneration of prothoracic glands.

80-1809. Newhouse, V. F.; D'Angelo, L. J.; Holman, R. C. (Virol. Div., Bur. Lab., Cent Disease Cont., PHS, US Dep. HEW, Atlanta, GA 30333) **DDT use and the incidence of Rocky Mountain spotted fever: a hypothesis.** *Environ. Entomol.* 8(5): 777-785; 1979 (30 references).

Since 1920 the incidence of Rocky Mountain spotted fever (RMSF) in the United States has followed a

peculiar cyclic pattern. After a peak incidence of 0.42 case/100,000 population in 1947 it decreased to an incidence of 0.11 case/100,000 population in 1960. Thereafter the incidence gradually increased until about 1970 when it began a spectacular rise to 0.50 case/100,000 population in 1977. The reason for the decline and subsequent increase in incidence in RMSF has been the subject of much speculation. The authors are advancing a new hypothesis to account for this pattern. The curve of the decline and subsequent increase in the incidence of RMSF coincides with the curve of the introduction, increase and decline in usage of DDT in the United States. The inverse correlation between these 2 events is statistically significant ($P = < 0.005$). It is suggested that the cyclic curve of the incidence of RMSF may reflect the temporary accidental control by DDT of the primary tick vector of RMSF, *Dermacentor variabilis* (Say) (Acarina: Ixodidae), as a nontarget species. (Author abstract by permission)

80-1810. Rall, D. P. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC 27709) **Relevance of animal experiments to humans.** *Environ. Health Perspect.* 32: 297-300; 1979 (9 references).

A discussion is presented on the best methods to determine the adverse human health effects of pollutants. It is suggested that even though the best evidence for an adverse effect is a properly conducted epidemiological study, humans should not be the only test animals. The best way of obtaining data on health hazards is a combination of well conducted laboratory tests using animals and epidemiological studies. Examples of epidemiological and laboratory animals studies which were used to illustrate the points discussed include a National Academy of Science National Research Council study of pest control practices and a study of hexachlorobenzene in Louisiana cattle. It is suggested that more efficient predictive laboratory tests must be developed, and that these laboratory tests must be validated or invalidated with epidemiological studies.

80-1811. Boyle, R. H.; Highland, J. H. (Author address not given) **The persistence of PCBs.** *Environment* 21(5): 6-13, 37; 1979.

A history of the use of PCBs and attempts to legislate their control is presented, along with a review of their effects in man. PCBs are among the most stable compounds known, and are found almost everywhere in the United States (US). It is estimated that 91% of all Americans have detectable levels of PCBs in their adipose tissue. PCBs were first manufactured in 1927, but they were not detected in the environment until 1966, and did not become a matter of urgent public concern until 1975. The discovery in 1970 that in some areas of the US the PCB levels in fish being used for human consumption were well above the FDA tolerance level of 5 ppm is described, along with attempts made at that time to legislate control. The events leading to passage of the Toxic Substances Control Act, which prohibited the manufacturing, processing and sale of all PCBs in the US starting in 1979, are detailed. Data on PCB contamination of fish and wildlife in the US of food and of human milk (an average PCB level of 1.8 ppm) are presented. It is pointed out that despite legislation, there is no comprehensive national recovery program for the 758 million pounds (341×10^6 kg) of PCBs currently in use, and there is no program to deal with the 290 million pounds (131×10^6 kg) in dumps and landfills and the 150 million pounds (68×10^6 kg) in soils, air and water.

80-1812. Berg, D.; Schmidt, R. R.; Ditgens, K.; Frommer, W.; Gau, W.; Kurz, J.; Schmidt, D.; Wuensche, C.; Schaefer, D.* (Fachber. Biol., Univ. Marburg, D-3550 Marburg, BRD) **Herbiplanin - ein herbizid wirkendes Nuclos-id mikrobieller Herkunft. [Herbiplanin - a nucleoside herbicide of microbial origin.]** *Hoppe-Seyler's Z. Physiol. Chem.* 361(3): 219; 1980 (German).

Streptosporangia strains 0296, 0547, and 0572 were investigated for their herbicidal properties. When applied to cress and mustard plants, collapse of the plant stalks was noted. The active agent was extracted from cultured Streptosporangia by means of adsorption on Lewapol, methanol desorption, ion exchange on a phosphocellulose column and chromatography on Biogel P-2. The active ingredient was identified as Herbiplanin, 2′-amino-2-deoxy-9-β-D-arabino furanosyl-adenine.

80-1813. Grumbach, K. H. (Bot. Inst., Univ. Karlsruhe, D-7500 Karlsruhe, BRD) **Effect of phytochrome and inhibitors of protein synthesis on the formation of chlorophylls and carotenoids in herbicide-treated radish seedlings.** *Hoppe-Seyler's Z. Physiol. Chem.* 361(3): 257-258; 1980.

Radish seedlings were grown for 6 days on 10^{-4} *M* DCMU (diuron) or bentazon (photosystem II herbicides) and on 10^{-4} *M* amitrole or 10^{-5} *M* SAN 6706 (chlorotic herbicides) in total darkness. The influence of active phytochrome was then studied by irradiating the treated plants with 5 min red light, 5 min far-red light, or 5 min red + 5 min far-red light every 24 hr. There were no differences in the accumulation of chlorophyll *a* among control and herbicide-treated plants, but in some cases the carotenoid pattern was different. There was enhancement of phytochrome mediated biosynthesis of carotenes and xanthophylls in DCMU treated plants and suppression of carotenoid accumulation in SAN 6706 treated plants. In a second study designed to test the cytoplasmic influence on the chloroplastic action of herbicides, treated plants were supplied with 10^{-4} *M* chloramphenicol and 10^{-4} *M* actidione. In SAN 6706 treated plants, chloramphenicol acted synergistically (resulting in lower carotenoid and chlorophyll content), while actidione acted antagonistically (resulting in a very high chlorophyll and carotenoid ac-

cumulation). The results suggest that SAN 6706, which acts via photooxidation of pigments, is enhanced by the simultaneous inhibition of protein synthesis in the chloroplasts by chloramphenicol. The results in plants treated with SAN 6706 and actidione (which inhibit protein synthesis in the cytoplasm) suggest that the photooxidation action of SAN 6706 in the chloroplast is developed by the cytoplasm.

80-1814. Knavel, D. E. (Dep. Hortic. & Landscape Archit., Univ. Kentucky, Lexington, KY 40546) **Response of pepper to transplant clipping and daminozide.** *HortScience* 14(5): 639-640; 1979 (16 references).

A plot of transplanted peppers (*Capsicum annuum* L.) were treated by clipping out the terminal bud with 1 or 2 of the youngest leaves. A second plot was sprayed at the rate of 2500 ppm with daminozide. A third plot served as control. The plants which had been clipped produced as well as control plants and had a higher yield than the daminozide-treated plants. Clipping increased branching, and thus increased fruiting sites on the plants. The fresh weight of clipped plants was similar to that of the daminozide-treated ones. Root and shoot growth of treated plants was less than that of control plants. It is noted that the different growth responses affected nitrogen and calcium absorption.

80-1815. Bourquin, A. W.; Garnas, R. L.; Pritchard, P. H.; Wilkes, F. G.; Cripe, C. R.; Rubinstein, N. I. (Environ. Res. Lab., US EPA, Gulf Breeze, FL 32561) **Interdependent microcosms for the assessment of pollutants in the marine environment.** *Int. J. Environ. Stud.* 13(2): 131-140; 1979 (6 references).

Five laboratory microcosms designed to assess the fate and effects of pollutants in marine and estuarine environments are described. The Environmental Fate Screening (EFS) system utilizes water, suspended particulates and heavy sand or sediments in small flasks to determine ecosystem substrate exchange coefficients and pollutant alteration rates. The Eco-Core (E-C) system is used to extract intact water and sediment cores from the sampling area to evaluate microbial degradation and the effects of chemicals on microbial ecology. Continuous flow systems are designed to limit the kinetic factors of an environment so that the dynamics of the environment can be determined. The aquatic gradient avoidance response system produces a pollutant gradient in a continuous flow system so that organism behavior can be monitored. The fifth system monitors changes in surfaces water features by benthic organism bioassays. Each of these systems was evaluated using methyl parathion (MP) as the test pollutant. In the EFS system it was determined that MP is irreversibly bound to suspended particulates by microbial mediation. Metabolism of MP found in sterile, sediment and water cores, collected and analyzed by the E-C system, was greatest in sediment. In continuous flow systems the importance of microbial degradation of bound MP was further illustrated. The benthic bioassay system indicated time and chemical concentration factors can alter the transport of nutrients and pollutants through the system.

80-1816. Singh, P. P.; Kumar, K. (G. B. Pant Univ. Agric. & Technol., Pantnagar, India) **Studies on the interaction between gamma-BHC and nitrogen application in sugar cane.** *Int. Sugar J.* 81(971): 329-331; 1979.

The interaction of γ-BHC (lindane) with applied nitrogen in sugar cane crops was investigated in field trials conducted over 3 crop seasons in a subtropical, humid climate. Lindane was applied at 0 and 1 kg/ha. Nitrogen was applied at 75 and 150 kg/ha; later in the study nitrogen levels were changed to 0, 50, 100 and 150 kg/ha. Lindane applied under optimum planting conditions during the first 2 growing seasons did not cause any change in percentage of germination, in the number of tillers and millable canes, or in cane yield. No interaction with nitrogen was noted, and it was concluded that the substitution of lindane for nitrogen is not practical.

80-1817. Swann, M. (BBC, Broadcasting House, London W1, England) **The biological credit-debit balance.** *Interdiscip. Sci. Rev.* 5(1): 2-5; 1980.

In recent years BBC television has helped to make the British public aware of the problems studied by science. In a shortened version of an address given by the chairman of BBC, the current issues of the extinction of species, the uses of herbicides and pesticides, genetic manipulation, and the misuse of antibiotics are reviewed. In the dilema of the widespread use of pesticides, it is suggested that the damage that DDT has caused to the environment must be considered when crediting this insecticide with the control of malaria. It is suggested that each of these topics of public concern be analyzed in a risk/benefit manner before deciding what steps should be taken for the future.

80-1818. Launer, J. E. (Lab. Serv., Oregon State Dep. Agric., Salem, OR 97310) **Report on pesticide formulations: halogenated and other insecticides.** *J. Assoc. Off. Anal. Chem.* 63(2): 225; 1980.

Current work carried out for the Association of Official Analytical Chemists on analysis of halogenated and other insecticides is reported. A collaborative study on an HPLC method for determination of captan has been completed, and it is recommended that the method be adopted as official first action for formulations containing captan as the only active ingredient. Methods are currently being investigated for the determination of dinocap, piperonyl butoxide, rotenone and other rotenoids, and toxaphene. An HPLC method has been developed for dicofol

and will be subjected to a collaborative study. A collaborative study of a GLC method for *N*-octyl bicycloheptene decarboximide (MGK 264) has been completed, and it is recommended that the method be adopted as the official first action method.

80-1819. Bontoyan, W. R. (Off. Pestic. & Toxic Subst., US EPA, Beltsville, MD 20705) **Report on pesticide formulations: herbicides, fungicides, and miscellaneous.** *J. Assoc. Off. Anal. Chem.* 63(2): 226-227; 1980.

A report is presented by the General Referee of the Association of Official Analytical Chemists (AOAC). The present status of work on the following selected topics is given: alachlor and propachlor, aluminum phosphide, atomic absorption spectrometry, benomyl, bensulide, bromacil and lenacil, bromoxynil, chlorophenoxy herbicides, chloroxuran, dicamba, fluchloralin, methazole, metribuzin, nitroasmines, oryzalin, pentachloronitrobenzene, physical properties of pesticides, propanil, rodenticides, sampling of pressurized cans, thiocarbamate herbicides, trifluralin, and benefin. It is recommended that the isomer specific assay of ester and salt formulations of 2-methyl-4-chlorophenoxy acetic acid (MCPA) and 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) by HPLC be adopted as the official first action method. An interim first action GLC method for bromoxynil was also approved.

80-1820. Hanks, A. R. (Texas Agric. Exp. Stn., Texas A&M Univ., College Station, TX 77843) **Report on pesticide formulations: organophosphorus pesticides.** *J. Assoc. Off. Anal. Chem.* 63(2): 228-229; 1980.

The current status of work on the analysis of organophosphorus pesticides as presented to the Association of Official Analytical Chemists is discussed. Gas liquid chromatography (GLC) methods for Bolstar, disulfoton, encapsulated parathion and methyl parathion, and an infra-red spectrometry (IR) method for azinphosmethyl are recommended for adoption as official first action methods. An HPLC method for ethion and a GLC method for malathion are recommended for adoption as official final action methods. Work on developing analysis methods for phosphamidon, ronnel and thionazin is recommended to be discontinued due to their very limited use as pesticides. Work will continue on tetrachlorvinphos, coumaphos, crotoxyphos, diazinon, dichlorvos, EPN, ethoprop, monocrotophos, and naled.

80-1821. Storherr, R. W. (Chem. & Biol. Invest., US EPA, Beltsville, MD 20705) **Report on carbamates, fumigants, and miscellaneous.** *J. Assoc. Off. Anal. Chem.* 63(2): 272; 1980.

Among the recommendations presented are continued intra-laboratory testing of methods for determinative steps in carbamate insecticide analysis and initiation of work on HPLC and fluorometric labeling for carbamate insecticide determinations. Work on gas chromatographic (GC) methods for analyzing ethylene oxide, ethylene chlorohydrin and ethylene bromohydrin in foods, and the analytical methods for determining inorganic bromides in grain will be continued. Methods for determining residual phosphine in fumigated products and a GLC method for determining the total residue of intact phosphine and phosphine derived from residual aluminum phosphide in wheat are to be further studied. It is proposed to continue official first action status of a GLC method for determining chloroform, carbon tetrachloride, trichloroethylene and ethylene dibromide in wheat and corn grains.

80-1822. Newsome, W. H. (Food Res. Div., Health Prot. Branch, Health & Welfare Canada, Ottawa, Ontario K1A 0L2, Canada) **Report on fungicides, herbicides and plant growth regulators.** *J. Assoc. Off. Anal. Chem.* 63(2): 273; 1980.

The current status of work for analytical determinations of fungicides, herbicides, and plant growth regulators is presented. An HPLC method is being developed for determining anilazine in potato and tomato. An HPLC method has been developed for the simultaneous determination of naphthalene acetic acid (NAA) and naphthalene acetamide in apples. Average recoveries of the amide at 0.01 and 0.1 ppm levels are 83 and 89%, respectively. A gas liquid chromatography (GLC) method for determining atrazine and cyanazine in corn and potato is ready for collaborative study and GLC methods proposed for chlorophenoxy alkyl acid and substituted urea herbicide determinations require further study. A GLC method for ethylene thiourea analysis is recommended for adoption as the official final action method. Further work on benomyl, MBC, thiabendazole, captan and other sulfonamides, dithiocarbamates, maleic hydrazide, and succinic acid 2,2-dimethyl hydrozide is recommended.

80-1823. Corneliussen, P. E. (Div. Chem. & Phys., US FDA, Washington, DC 20204) **Report on multiresidue methods (interlaboratory studies).** *J. Assoc. Off. Anal. Chem.* 63(2): 276-277; 1980.

The current status of work on six topics associated with multiresidue methods are reported to the Association of Official Analytical Chemists. Work is continuing on comprehensive multiresidue extraction studies and gas-liquid chromatography (alkaline precolumn). A collaborative study involving solutions of pesticides [dichloro-bis(phenyl)ethane derivatives] has been completed. A closed system sample digestion method for analysis of Cd, Pb, As, Se and Zn in foods is recommended

for official first action adoption. Work is being carried out on modifications a method that will use resin separations in conjunction with multi-element detection systems. A method for the detection of organophosphorus pesticide residues in fruits and vegetables has been modified by substituting a toluene-acetone mixture for the acetonitrile-benzene mixture in the charcoal column elution. The revised method underwent a successful interlaboratory trial including six organophosphorus pesticides in varying combinations on six different crops.

80-1824. Burke, J. A. (Div. Chem. & Phys., US FDA, Washington, DC 20204) **Report on organochlorine pesticides.** *J. Assoc. Off. Anal. Chem.* 63(2): 277-282; 1980.

A brief summary of the analytical procedures for organochlorine pesticides is presented. Recommendations are made for improved clean-up procedures of chlorobenzilate, chloropropylate and bromopropylate residues in fruits and nuts, for improved detection of the photolytic derivatives of organochlorines, and for improved extraction efficiency from low moisture high fat samples. In collaborative studies on Kepone (chlordecone) residues in crab, oyster and fish samples, results were low and had poor precision. A miniaturized extraction and clean-up procedure in combination with electron capture gas chromatography is recommended for studying organochlorine pesticides in fish. Improvement of a saponification clean-up method is described. The procedure for determining mirex and hexachlorobenzene in adipose tissue was recommended for adoption as the official first action method.

80-1825. McCully, K. A. (Health Prot. Branch, Health & Welfare Canada, Ottawa, Ontario K1A 1B7, Canada) **Report on organophosphorus pesticides.** *J. Assoc. Off. Anal. Chem.* 63(2): 283-285; 1980 (26 references).

A review of work on methodology for organophosphorus pesticides is presented. Among the methods discussed are electron capture GLC determination of chlorpyrifos and its pyridinol metabolite in tissues of cattle; recovery of fenitrothion, fenitrooxon and aminofenitrothion from water using Amberlite XAD-2 resin; GLC with flame photometric detection for determination of fenitrothion in clams and mussels; a method for determination of fenthion and five oxidative metabolites in fat; GLC with electron capture detection of malathion in wheat and corn; and the HPLC separation of methyl parathion and fenitrothion metabolites. A screening method for the determination of 16 organophosphorus pesticides in drinking water, a multi-residue method for 75 pesticide residues in 25 fruits and vegetables, a cellulose column cleanup for organophosphorus pesticides, and the use of gas chromatography-single ion mass spectrometry to quantitatively conform dimethoate residues in wheat plants are also summarized. It is reported that an automated procedure has been developed, based on gel permeation cleanup and electron capture GLC detection, for the determination of organochlorine pesticide residues in chicken fat.

80-1826. Moore, H. P.; Hanks, A. R.; Zweig, G.; Collier, R. H.; Glocker, E. M. (Consumer Anal. Lab., Ohio State Dep. Agric., Reynoldsburg, OH 43068) **Report of subcommittee A on recommendations for official methods.** *J. Assoc. Off. Anal. Chem.* 63(2): 299-302; 1980.

A subcommittee of the Association of Official Analytical Chemists reports on recommendations for studies on official analytical methods. Studies in the areas of feeds, fertilizers, hazardous substances, pesticide formulations, plants, reference materials and standard solutions, and tobacco are listed. The current status of studies and recommendations are given for 83 pesticides formulations, under the headings of carbamate insecticides and substituted urea insecticides, halogenated and other insecticides, herbicides, fungicides and miscellaneous, and organophosphorus pesticides.

80-1827. Williams, S.; Cummings, J. G.; Helrich, K.; Puma, B. J.; Butler, S. W. (Div. Chem. Technol., US FDA, Washington, DC 20204) **Report of subcommittee E on recommendations for official methods.** *J. Assoc. Off. Anal. Chem.* 63(2): 312-318; 1980.

A subcommittee of the Association of Official Analytical Chemists reports on their recommendations for official analysis methods for a wide range of compounds. Areas covered include carbamate pesticides, fumigants and miscellaneous (11 topics); fungicides, herbicides and plant growth regulators (28 topics); metals and other elements (15 topics); multiresidue methods (interlaboratory studies) (7 topics); organochlorine pesticides (16 topics); organophosphorus pesticides (8 topics); radioactivity (9 topics); and water (3 topics). For each topic, recommendations for future study as well as recommendations for official adoption of some methods are given.

80-1828. Bontoyan, W. R.; Launer, J. E. (Off. Pestic. Programs, US EPA, Beltsville, MD 20705) **Report on the twenty-third annual meeting of the Collaborative International Pesticides Analytical Council (CIPAC).** *J. Assoc. Off. Anal. Chem.* 63(2): 332-335; 1980.

A report is presented on the decisions concerned with the adoption of new methods for analysis of pesticides or the change of status of some methods previously adopted. Tested methods for the determination of 2,4-D, 2,4,5-T, malathion, 2,3,6-TBA + MCPA, MCPB, mercury, folpet, linuron, 2,4-DB, dichlorprop, bromoxynil, monuron, terbutylazine, and dinoterb were adopted.

Methods for the determination of mecoprop, ethion, and bromacil were accepted as provisional methods.

80-1829. Chang, S. C.; Borkovec, A. B. (Insect Reprod. Lab., Agric. Res., SEA, USDA, Beltsville, MD 20705) **Effects of diflubenzuron and penfluron on viability of house fly eggs.** *J. Econ. Entomol.* 73(2): 285-287; 1980 (7 references).

^{14}C-labeled diflubenzuron or penfluron injected into female *Musca domestica* L. was deposited without degradation in the flies' eggs; as a result, hatch and F_1 emergence were reduced. Eggs containing 10 pg/egg of either compound hatched normally but eggs containing ca. 680 pg/egg of diflubenzuron or 370 pg/egg of penfluron did not hatch. At equal doses, more penfluron than diflubenzuron was deposited in eggs, but the residues of both compounds increased with the dose and decreased in successive egg batches. The practical usefulness of this type or reproduction inhibitor apparently depends not only on its intrinsic activity but also on its metabolic and excretion characteristics. (Author abstract by permission)

80-1830. Schuster, D. J. (IFAS, Agric. Res. & Sci. Cent., Univ. Florida, Bradenton, FL 33508) **Tomato pinworm: larval survival, development, and damage on tomato treated with organotin compounds.** *J. Econ. Entomol.* 73(2): 310-312; 1980 (4 references).

In 3 laboratory experiments, survival and development of larvae of *Keiferia lycopersicella* (Walsingham) were reduced when they were fed excised tomato leaflets dipped in solutions of cyhexatin, triphenyltin hydroxide, and SN 513 (9-aza,1,17 diguanidinoheptadecane triacetate). Triphenyltin hydroxide caused leaflets to deteriorate, requiring leaflets to be replaced frequently. The compounds reduced foliage and fruit damage on tomato plants sprayed in the field. Phytotoxicity (distortion of new growth, plant stunting and reduced yield) was apparent in a spring experiment but not in a fall experiment. (Author abstract by permission)

80-1831. Hill, J. (Environ. Res. Lab., US EPA, Athens, GA 30601) **Mathematical modeling of pesticides in the environment: current and future developments.** *J. Environ. Syst.* 9(2): 99-108; 1979 (29 references).

A review of mathematical models that are used to characterize the response of environmental systems to pesticides is presented. Current transport, total ecosystem, evaluative, hierarchical and influence analysis models provide an approximation of the indirect effects of pesticides when complete ecological characterization data are not available. The weaknesses of these individual micro-scale models is that they are difficult to extrapolate to the interactive ecosystem. Suggestions for using macro-scale models, such as microcosms and coupled subsystems, to more accurately define the impacts of pesticides in the overall environment are made.

80-1832. Sparks, A. N.; Carpenter, J. E.; Klun, J. A.; Mullinix, B. G. (Southern Grain Insects Res. Lab., Agric. Res., SEA, USDA, Tifton, GA 31794) **Field responses of male *Heliothis zea* (Boddie) to pheromonal stimuli and trap design.** *J. Ga. Entomol. Soc.* 14(4): 318-325; 1979 (3 references).

Tests were carried out to measure the relative efficiency of virgin female traps and sex pheromone stimuli to monitor and/or control populations of the corn earworm (*Heliothis zea*). The field study was carried out in an experimental farm in Georgia. Traps were placed near plots of corn in varying stages of maturity. Three different types of trap (pie plate or sticky trap, wind-vane trap, and grid trap) were tested. Virgin females, or mixtures of 4 chemicals recently identified as the sex pheromone produced by *H. zea* females were used as bait. Nocturnal observations were made, and male catches were recorded each morning. The grid trap was the most efficient, followed by the wind-vane, then the sticky trap. Results indicate that 133.6 μg of the full complement of 4 aldehydes are approximately 75% as efficient as four 24- to 72-hr-old virgin females in attracting males to traps.

80-1833. Coudriet, D. L.; Seay, R. S. (Boyden Entomol. Lab., Univ. California, Agric. Res., SEA, USDA Riverside, CA 92521) **Diflubenzuron: laboratory evaluation against 3 lepidopteran pests of vegetables.** *J. Ga. Entomol. Soc.* 14(4): 325-329; 1979 (7 references).

Laboratory studies were carried out to determine the efficacy of diflubenzuron as a moulting inhibitor in the cabbage looper, *Trichopulusia ni* (Hubner), beet armyworm, *Spodoptera exigua* (Hubner), and tobacco budworm *Heliothis virescens* (F.). Larva of various stages (1st to 5th instar) were exposed to artificial diet, the surface of which was treated with a range of diflubenzuron concentrations (10-1000 ppm). The first 3 larval instars of all species were more susceptible than the later instars. Mortality occurred in treated cabbage loopers at all stages of development, and at all concentrations tested, with development to the adult stage taking place only at the lowest concentration (10 ppm). Diflubenzuron levels of 100 ppm were effective in preventing the first 3 instars of the beet army worm from reaching the fourth and fifth larval stages. The tobacco budworm larvae were more tolerant of the insecticide than the larva of the other 2 species. A practical implication of the research is that where these 3 insects may be present in a crop at the same time, the diflubenzuron concentration effective against the beet armyworm and cabbage looper would not necessarily be effective against the tobacco budworm.

80-1834. Sutton, R. M.; Gardner, W. A.; Kraus, D. W.; Noblet, R. (Dep. Entomol. & Econ. Zool., Clemson Univ., Clemson, SC 29631) **Effects of ecdysone, juvenile hormone, and structurally related compounds on *Nomuraea rileyi, Beauveria bassiana,* and *Tritirachium dependens in vitro.*** *J. Ga. Entomol. Soc.* 14(4): 364-373; 1979 (21 references).

In vitro investigations were designed to test the effects of juvenile hormone (JH) and ecdysone (MH) on the growth of 2 deuteromycete pathogens *Nomuraea rileyi* and *Beauveria bassiana* and of *Tritirchium dependens*, a nonpathogenic deuteromycete closely related to *B. bassiana.* Farnesol and cholesterol were also tested because of their structural similarity to JH and MH. Media containing 1, 2, 3 or 4 ppm of the test substances was inoculated with conidia of the appropriate fungus and incubated for 10 days. Fungal development was assayed by total dry weight of the mycelia. *N. rileyi* growth was promoted by 3 or 4 ppm MH and inhibited by several concentrations of cholinesterol and farnesol, while JH had no significant effect. *B. bassaria* growth was promoted by JH and MH, while cholesterol and farnesol had no effect. Growth of the nonpathogen *T. dependens* was not promoted by any of the test compounds. It is suggested that the residues support the theory of *in vivo* hormonal interactions between entomogenous pathogens and their hosts.

80-1835. Patterson, J. W.; Schwarz, M. (Dep. Biol., Univ. Zambia, Lusaka, Zambia) **The activity of the juvenile hormone mimics for the eggs of *Rhodnius prolixus.*** *J. Insect Physiol.* 25(5): 399-404; 1979 (32 references).

The relationship between chemical structure and activity of juvenile hormone (JH) mimics for eggs of *Rhodnius prolixus* were examined. Twenty-four JH mimics of several different chemical classes were tested. Freshly laid eggs were treated with 0.05 μl JH mimic solution in methyl ethyl ketone. Eggs were incubated for 3-4 wk, and the effect of the JH mimics was assessed in terms of their ability to prevent eclosion. In addition, results were compared with previously reported data on treatment of last instar larvae of *R. prolixus* with JH mimics. All chemical classes tested except one of the natural JHs and two very closely related long chain compounds contained members that inhibited eclosion. The most active chemicals were derivatives of geranyl *para*-aminobenzoic acid esters and aryl methylene dioxyphenyl ethers. Although not all structure activity relationships of JH mimics for last instar larvae were applicable to eggs, those chemicals of a particular class which had highest morphogenetic activity when applied to last instar larvae, were also active in inhibiting eclosion.

80-1836. Panbangred, W.; Pantuwatana, S.; Bhumiratana, A. (Dep. Microbiol., Fac. Sci., Mahidol Univ., Bangkok 4, Thailand) **Toxicity of *Bacillus thuringiensis* toward Aedes aegypti larvae.** *J. Invertebr. Pathol.* 33(3): 340-347; 1979 (22 references).

Six strains of *Bacillus thuringiensis* and five other *Bacillus* species were tested for biological control effectiveness against *Aedes aegypti* second-instar larvae. The LC50 concentrations of each microbial preparation were determined. *B. thuringiensis* strains HD1 and BAO68, at 5.7×10^4 and 2.4×10^5 organisms/ml, respectively, were the only effective agents. These two strains were then further tested for their effects on various stages of *A. aegypti* larvae and for the effects of temperature and γ-radiation on the toxicity of *B. thuringiensis* cultures to *A. aegypti.* It was determined that the toxicity of *B. thuringiensis* is associated with the crystals and not the spores of the bacteria.

80-1837. Sharpe, E. S.; Detroy, R. W. (North. Reg. Res. Cent., Agric. Res., SEA, USDA, Peoria, IL 61604) **Susceptibility of Japanese beetle larvae to *Bacillus thuringiensis:* associated effects of diapause, midgut pH, and milky disease.** *J. Invertebr. Pathol.* 34(1): 90-91; 1979 (2 references).

Experimentation determined that the midgut contents of healthy Japanese beetle larvae varied from pH 6.83 to 10.2. Of 30 healthy larvae studied only 7 had sufficient alkalinity in the midgut region to dissolve parasporal crystals of *Bacillus thuringiensis.* Seven of the larvae tested were diseased (milky disease) and among these 3 had sufficiently alkaline midguts to dissolve *B. thuringiensis* crystals. It was concluded that in the fall most healthy larvae are already in winter diapause and that most effective applications of *B. thuringiensis* would be in the spring and later summer.

80-1838. Anonymous **New journal announcement.** *J. Plant Nutr.* 1(1): i-ii; 1979.

A new quarterly journal concerned with plant mineral nutrition, both essential and non-essential, has been established, *Journal of Plant Nutrition.* Abstracts of pertinent articles from *Journal of Plant Nutrition* will be published in appropriate sections of future issues of *Pesticide Abstracts.*

80-1839. Vlasenko, A. N.; Sumina, R. S. (Res. Inst. Chem. Agric., Novosibirsk, USSR) **Vliianie gerbitsidov na kachestvo zerna iarovoi pshenitsy. [Effect of herbicides on quality of grain of spring wheat.]** *Khim. Sel'sk. Khoz.* 17(12): 5-7; 1979 (20 references) (Russian).

The effect of the herbicides Dosanex (metoxuron), N′-(3-chloro-4- methoxyphenyl)-N′-N′-dimethylurea (metoxuron), Dialen and Diamet-D (mixtures of dimethylamine salts of 2-methoxy-3,6-dichlorobenzoic acid and 2,4-D), Lumeton [mixture of simazine, 2M-4CP (mecoprop)

and methoprotryne], and Baiyalan [mixture of Propanid (propanil) and Yalan (molinate)] on the quality of grain of spring wheat was studied. It was found that herbicides did not affect the energy of germination and germination rate of wheat seeds. Diamet-D, Dialen, Lumeton, and Dosanex did not change the level of gluten, protein, ash, and cellulose in the grain. Treatment with Baiyalan (2-4 kg/ha) increased the level of protein by 11-19%.

80-1840. Guida, N. I.; Kul'pina, N. V. (Kuban Agric. Inst., Krasnodar, USSR) **Primenenie treflana na posevakh kukuruzy v usloviiakh orosheniia. [Use of Treflan in irrigated corn crop.]** *Khim. Sel'sk. Khoz.* 17(12): 14-16; 1979 (7 references) (Russian).

The herbicide Treflan (trifluralin) was tested in 2 systems of crop rotation: corn-corn and corn-winter wheat. The corn was cultivated under irrigation conditions. Treflan was applied on day 2 after corn seeding at rates of 0.7, 1.4, and 2.1 kg/ha. Treflan had a toxic effect on corn seedlings, causing the decrease of the thickness of stand and corn yield. Treflan showed rapid degradation in the soil and did not have a negative effect on the second crop.

80-1841. Samersov, V. F.; Prishchepa, I. A. (Byelorussian Res. Inst. Plant Prot., USSR) **Vliianie gerbitsidno-insektitsidnykh smesei na soderzhanie sakharov v rasteniiakh iachmenia. [Effect of herbicide-insecticide mixtures on level of sugars in barley plants.]** *Khim. Sel'sk. Khoz.* 17(12): 18-21; 1979 (12 references) (Russian).

An attempt was made to evaluate the effect of pesticides Banvel-D (dicamba; 0.1 kg/ha), amine salt of 2,4-D (1.5 kg/ha), metaphos (methyl parathion; 1 kg/ha), phosalone (2 kg/ha), phosphamide (dimethoate; 1 kg/ha), and their mixtures on the carbohydrate metabolism in barley plants. Treatment with herbicides and insecticides resulted in inhibition of accumulation of disaccharides in aerial parts of barley. The most pronounced inhibitory effect was recorded after treatment with binary and tertiary mixtures of phosphamide; the level of disaccharides was decreased by 36.4-37.3%, as compared with the nontreated control.

80-1842. Lysenko, A. K. (Ukrainian Res. Inst. Irrig. Farming, USSR) **Vliianie prometrina i treflana na zasorennost', urozhai i kachestvo semian soi v usloviiakh orosheniia. [Effect of prometryne and treflan on weediness, yield, and quality of soya seeds under irrigation.]** *Khim. Sel'sk. Khoz.* 17(12): 21-23; 1979 (Russian).

The results of trials of the herbicides prometryne (2 kg/ha) and Treflan (trifluralin; 2 kg/ha) in irrigated soy bean crops are presented. Treflan was almost equally toxic to dicotyledonous and monocotyledonous weeds, while prometryne was more effective against dicotyledonous weeds. Herbicides did not decrease the thickness of stand of soy plants; there was an increase of the weight of green parts and seeds. Herbicides resulted in a significant increase in the levels of protein in soybeans. Soybeans did not contain residual amounts of prometryne or Treflan.

80-1843. Malkina, L. S. (Southern Res. Inst. Hydrotechnics & Melioration, USSR) **Smesi gerbitsidov na posevakh soi. [Herbicide mixtures in soybean crop.]** *Khim. Sel'sk. Khoz.* 17(12): 23-24; 1979 (Russian).

The results of trials of herbicide mixtures [Treflan (trifluralin) in combination with prometryne, linuron, Tetral, simazine or 2,4-D) in soybean crop are reported. The most effective control of dicotyledonous weeds was provided by a mixture of Treflan with linuron (1.5 + 3 kg/ha). Use of herbicide mixtures resulted in significant increase of the yield of green mass and seeds of soybeans. The crop did not contain residues of herbicides.

80-1844. Anonymous **New journal announcement.** *Mar. Ecol. Progr. Ser.* 1(1): i-ii; 1979.

A new journal, *Marine Ecology - Progress Series*, has been established to cover the entire field of marine ecology. This quarterly publication includes in its scope environmental factors, physiological mechanisms, cultivation, dynamics and ocean management. Abstracts of pertinent articles from *Marine Ecology - Progress Series* will be published in appropriate sections of future issues of *Pesticides Abstracts*.

80-1845. Lund-Hoie, K. (Dep. Herbol., Norweigian Plant Prot. Inst., Agric. Univ. Norway, Vollebekk, Norway) **The physiological fate of glyphosate ^{14}C in *Betula verrucosa* and *Fraxinus excelsior*. The effect of ammonium sulfate and the environment on the herbicide.** *Meld. Nor. Landbrukshoegsk.* 58(30): 2-24; 1979 (27 references).

^{14}C-Glyphosate at rates of 0.25 μCi (21.9 μg AI glyphosate) was applied to mature leaves of *Betula verrucosa* and *Fraxinus excelsior*. Absorption and translocation of the herbicide were measured 1, 3, 6, 12, 24 or 48 days after treatment. *F. excelsior* leaves absorbed the herbicide twice as slowly and to a much lesser extent (20%) than did *Betula* leaves, whose uptake reached about 70%. In *Betula*, ^{14}C-glyphosate was translocated to areas of high meristematic activity, while in *Fraxinus* most translocation occurred laterally from phloem to xylem and thus accumulated in mature leaves. Ammonium sulfate added to the glyphosate spray at concentrations of 0.5-5.0% increased both the absorption and translocation of glyphosate by about 2-3 times in both species. Temperature increases increased the translocation rates of glyphosate in *Betula* by about 3% in the 12-18°C range and by 10% in the 18-24°C

range. An increase in RH from 50% to 70% at 24°C resulted in significant increases in glyphosate translocation rates. Maximum movement of glyphosate occurred at high temperatures and RH conditions when the optimum concentration of 1% $(NH_4)_2SO_4$ was added.

80-1846. Rathburn, C. B., Jr.; Boike, A. H., Jr.; Hallmon, C. F.; Cotterman, S. G. (W. Florida Arthropod Res. Lab., Florida Dep. Health & Rehab. Serv., Panama City, FL 32401) **Small plot field tests of methoprene for the control of asynchronous broods of *Culex nigripalpus* Theob. in Florida.** *Mosq. News* 40(1): 19-23; 1980 (8 references).

A study was designed to determine an effective dosage of the juvenile hormone analog methoprene for the control of multiple broods of *Culex nigripalpus* Theob. Experiments were carried out in Florida in a series of eight specially constructed fresh water ponds. Two nets containing second instar larvae were placed in each pond. Pupation and adult emergence were recorded. Two formulations of methoprene (a sand formulation and a water formulation) were tested over a period of about 5 mo. The dosages of the sand formulation were 0.022 kg AI/ha and 0.011 kg AI/ha, each applied twice a week, and 0.022 kg AI/ha applied once a week. The dosages of the water formulation were 0.045 kg AI/ha, 0.030 kg AI/ha, and 0.015 kg AI/ha each applied twice a week, and 0.030 kg AI/ha applied once a week. The results indicate that two applications per week of a sand granular formulation at 0.022 kg AI/ha or two applications per week of a water formulation at 0.030 kg AI/ha were required for effective control.

80-1847. Papasozomenos, S. (Case Western Reserve Univ., Cleveland, OH 44106) **The rat poison Vacor.** *N. Engl. J. Med.* 302(20): 1146-1147; 1980 (1 reference).

In this letter to the editor autopsy findings on a patient with Vacor (pyriminil) poisoning are reported. The 39-yr-old man ingested 3 packets of warfarin-type rat poisoning with no effect, followed one day later by ingestion of 3.6 g of the rat poison Vacor. Effects included orthostatic hypotension with severe hypotensive episodes, absence of deep-tendon reflexes, loss of pain sensation and proprioception, seizures and hyperglycemia. The patient became unconscious 1 wk before death, which occurred 19 days after Vacor ingestion. Neuropathologic findings noted at autopsy included severe loss of ganglion cells in the paravertebral sympathetic ganglions, marked loss of neurons in dorsal-root ganglions, and marked degeneration of the posterior roots and columns. Swelling of nerve fibers with thinning of the myelin sheaths occurred in the sural nerve, and isolated degenerated and regenerating fibers were seen in the skeletal muscle.

80-1848. Fears, W. B. (Reynolds Army Hosp., Lawton, OK 73503) **The rat poison Vacor.** *N. Engl. J. Med.* 302(20): 1147; 1980 (3 references).

In this letter to the editor of a 48-yr-old woman with irreversible coma secondary to hypoglycemia caused by the rat poison Vacor (pyriminil) is reported. The Vacor toxicity was manifested by orthostatic hypotension, gastrointestinal hypomotility with malabsorption, peripheral neuropathy, and diabetes mellitus. The patient did well taking a small dose of insulin, but at a time of depression reduced her food intake and slipped into an irreversible hypoglycemia coma. It is pointed out that impairment of catecholamine release is responsible for impaired gluconeogenesis and presents a danger of death or irreversible brain damage if hypoglycemia occurs when the patient is alone.

80-1849. Chappelka, R. (Rohm & Haas Co., Bristol, PA 19007) **The rat poison Vacor.** *N. Engl. J. Med.* 302(20): 1147; 1980.

This letter to the editor stresses the need for early recognition and treatment of Vacor (pyriminil) ingestion. It is noted that the company producing Vacor voluntarily stopped the sale of Vacor in May 1979 and distributors were asked to return existing inventories. On December 12, 1979, in the *Federal Register* the EPA published its notice of intent to cancel the registration of this rodenticide.

80-1850. LeWitt, P. (Stanford Univ. Med. Cent., Stanford, CA 94305) **The rat poison Vacor.** *N. Engl. J. Med.* 302(20): 1147; 1980 (5 references).

A reply to letters to the editor regarding the rodenticide Vacor (pyriminil) is presented. It is noted that lesions reported in both peripheral and central-nervous-system structures support the clinical impression of multiple sites of Vacor neurotoxicity, but the pathological basis for other dysantonomic states (gastrointestinal hypomotility) and encephalopathy are still unexplained. A case is mentioned in which a child developed severe hypoglycemia the day after intoxication but before insulin treatment. Nonketotic hyperglycemia which lasted for several weeks developed later, but there was an eventual return to normal glucose homeostasis. It is pointed out that the management of diabetes mellitus produced by Vacor is often difficult to manage due to lability in insulin requirements and to eating difficulties caused by gastrointestinal hypomotility.

80-1851. Anonymous **US agency denies Agent Orange cover up.** *Nature (London)* 284(5756): 506; 1980.

Veterans Administration (VA) officials denied charges made by congress which accused a member of the VA of referring to 2,4,5-T (Agent Orange) as carcinogenic and mutagenic in a 1977 memorandum. Congressmen claimed the VA had given misleading information when it testified earlier that the herbicide caused no risk to human

health. A VA administrator pointed out that the source of the memorandum containing claims that Agent Orange had been found teratogenic to an unborn fetus was unfounded. He added that the author of the memo was unknown and that no-one in the VA had even seen the memo before.

80-1852. Anonymous **Australia orders Agent Orange inquiry.** *Nature (London)* 284(5756): 506; 1980.

The Australian government, spurred by campaigns by community and servicemen's groups, has approved a two million dollar project to examine the health of its military personnel exposed to Agent Orange (2,4,5-T) during the Vietnam War. The health of family members of exposed servicemen will also be surveyed. The proposed project, which is to be conducted by the Sydney University Commonwealth Institute of Health, has been criticized by veterans organizations that claim the survey will take too long to be of any immediate aid to servicemen who may be harboring health defects due to Agent Orange exposure. A representative of the Returned Services League argued that a smaller survey would provide the necessary information faster than the one presently planned. Another veterans group claimed it already possessed evidence of birth defects due to wartime exposure to the herbicide.

80-1853. Ogawa, K.; Aizawa, H.; Yamauchi, F. (Mitsubishi Kasei Inst. Toxicol. & Environ. Sci., Midori-ku, Yokohama 227, Japan) **Absorption, translocation and metabolism of fluoroimide in Inu-apple trees, *Malus prunifolia* Borkhousen.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 29-36; 1980 (11 references).

Foliar applications of fluoroimide remained on the sprayed portion of the leaves for 1 day after treatment. Translocation after this time was into the upper portion of the leaves. Fluoroimide decreased to 50% in 20 and 30 days on the leaves of fruits of Inu-apple trees under the conditions of these experiments. On the surface of the leaves the chemical remained largely unchanged and was only slowly absorbed. At 9 days after treatment, only 2% of the applied fluoroimide was translocated into the leaves. The major metabolite was sodium 4-fluorodichloromaleanilate, a hydrolyzed compound of the imide ring. A metabolic pathway for the chemical is proposed.

80-1854. Anonymous **NIOSH finds dioxin, carcinogens in plant dust samples near landfill.** *Occup. Saf. Health Rep.* 9(32): 747; 1980.

Results are reported of an environmental evaluation of 3 plants in Hyde Park, N.Y. located near a landfill used by a chemical company as a dumpsite. The studies were undertaken in response to reports that plant workers were suffering facial lesions, troubled breathing, nausea, burning eyes, and diffuse itching. Minute amounts of dioxin and nanogram quantities of mirex and lindane were found in dust samples. Traces of dioxin were found in water samples taken from sediment in Bloody Run Creek, which runs close to the landfill, but none were detected in air samples taken from the plants or Bloody Run Conduit. Medical examination of 425 persons who had worked or lived in the area showed no current evidence of chloracne, no evidence of an excessive frequency of thyroid gland nodules, and no evidence of an excessive frequency of liver, blood cell or kidney disease. It is pointed out that workers and residents may still be at an increased risk of delayed disease due to exposure to the chemicals.

80-1855. Young, L. W.; Camper, N. D. (Dep. Biochem., Clemson Univ., Clemson, SC 29631) **Trifluralin effects on tobacco callus tissue: mitosis and selected metabolic effects.** *Pestic. Biochem. Physiol.* 12(2): 117-123; 1979 (29 references).

The herbicide trifluralin has been observed to inhibit the growth of pith callus of the S-73 variety of the tobacco, *Nicotiana tobacum*. Light microscopy studies of cell division in callus tissue cultured in trifluralin-treated medium (5 μM) for 2 wk were conducted using Feulgen reagent. Tobacco callus was cultured on medium containing 5 μM of trifluralin for periods of 1 to 14 days before being transferred to vials containing ^{14}C precursors to ascertain the time at which mitotic inhibition took place. Results showed a decrease in the number of cells in metaphase, anaphase, and telophase in the trifluralin-treated tissue. Arrested metaphases and multi-nucleated cells were also observed in the callus cells cultured on herbicide-treated medium. Culturing of callus tissue cells on medium containing 0.1 mM colchicine gave similar results. Trifluralin at levels of 5 μM inhibited apparent RNA, DNA, and protein synthesis after 5-7 days of herbicide treatment. Colchicine inhibition of protein synthesis was detected as early as 3 days after the start of treatment, while inhibitions in DNA and RNA were not observed until day 7-8 of treatment.

80-1856. Churchill, K.; Klepper, L. (Dep. Agron., Univ. Nebraska, Lincoln, NB 68583) **Effects of ametryn {2-(ethylamino)-4-(isopropylamino)-6-(methylthio)-*s*-triazine} on nitrate reductase activity and nitrite content of wheat (*Triticum aestivum* L.).** *Pestic. Biochem. Physiol.* 12(2): 156-162; 1979 (28 references).

Wheat (*Triticum aestivum* L.) seedlings were grown on medium containing 5 mM nitrate, 5 mM ammonia, or in the absence of nitrogen. Leaves of 7-10 day old plants were dipped into a 4.4 mM solution of ametryn and later sampled for analysis of *in vivo* nitrate reductase activity (NRA), *in vitro* NRA, and nitrite. Within a 26 hr period, both *in vivo* and *in vitro* NRA were reduced. *In vivo* NRA decreased faster than *in vitro* NRA. Only 3% of normal *in vivo* NRA remained after 26 hr in the ametryn-

treated plants. *In vivo* assays on leaf tissues conducted in light showed an inhibition of photosynthetic electron flow by ametryn. Nitrite was accumulated in nitrate-grown, ametryn-treated plants, and these plants died and were completely desiccated after 10 days. No nitrite was stored in the ametryn-treated plants grown on ammonia and zero-nitrogen medium after 10 days; these plants were slightly chlorotic but still alive. Nitrate-grown ametryn-treated plants were also found to emit low levels of NO(X) (NO_2 and/or NO).

80-1857. Schefczik, K.; Simonis, W. (Lehrstuhl Bot. I, Univ. Wurzburg, D-8700 Wurzburg, BRD) **Side effects of chlorinated hydrocarbon insecticides on membranes of plant cells. 1. The influence of lindane on the membrane potential of *Elodea densa* leaf cells.** *Pestic. Biochem. Physiol.* 13(1): 13-19; 1980 (21 references).

The electrophysiological behavior of untreated leaf cells from *Elodea densa* plants was studied. Subsequent studies were then performed on plants treated with lindane at sublethal doses. A time-dependent inhibition of light-induced membrane potential levels was noted in plants exposed to lindane treatment. Complete insensitivity of the membrane potential to illumination was achieved after 10 hr of exposure to lindane at 10 ppm. The level of the diffusion potential was decreased by lindane exposure. Lindane greatly lowered the voltage responses of the diffusion potential to rapid changes in the potassium/sodium relation of the outer solution. It is suggested that there is a direct interaction of lindane with the plasmalemma which causes a loss of the potassium/sodium selectivity. It is concluded that lindane selectively attacks the biomembranes in living plant cells.

80-1858. Magallona, E. D. (Pestic. Residue Lab., Univ. Philippines, Los Banos, Philippines) **Pesticide residues and relevant directions for developing countries.** *Residue Rev.* 73: 13-25; 1980.

The need for developing countries to be concerned with possible environmental contamination and accumulation of pesticide residues is expected to be different from developed countries. While developing countries, not including China, account for approximately 18% of the world consumption of pesticides, there is still a need to implement residue monitoring programs in developing countries before serious environmental problems evolve. An outline of constraints to a successful residue program and proposed directions for the program in developing countries are presented. Constraints include inadequate facilities and technical staff. Good agricultural practices, division of responsibility between similar departments, selective environmental monitoring and directed residue foodstuff monitoring are discussed as means of successfully implementing a residue monitoring program in the Philippines. It is suggested that the same approach can be used in other developing countries.

80-1859. Frehse, H.; Timme, G. (Sparte Pflanzensch., Anwendungstech., Biol. Forsch., Inst. Rueckstandsanal., Bayer AG, D-5090 Leverkusen, BRD) **Quantitative residue analytical reliability: beatitude through application of latitude.** *Residue Rev.* 73: 27-47; 1980 (20 references).

Residue methods must be as specific and reliable as possible and defensible in a courtroom. However, the question remains what limit of accuracy, or acceptable quantitative latitude, should be granted to dependable residue data. Views, advocated by Gunther and later upheld by other colleagues, are known to and accepted by most residue analysts but only few seemingly practice them systematically when it comes to interpreting the results of their analyses. Unlike investigations directed towards determining the margin of error or the reproducibility of particular analytical processes, the analyst in his daily routine work usually is left entirely to his own devices in estimating the reliability of his results. This becomes problematic especially when the results must be assigned to legally stipulated limit values. In this paper, a start towards the realization of a schematized latitude concept has been made and could be carried further. Simple mathematical relationships are discussed, and graphically represented, which could make it easier to achieve this aim. Some potential utilities of the latitude concept are discussed. (Author abstract by permission, abridged.)

80-1860. Conkin, R. A. (Agric. Res. Dep., Monsanto Co., St. Louis, MO 63166) **From one to point zero one part per million: the first 25 years.** *Residue Rev.* 73: 87-92; 1980.

The significance of pesticide resides in feed, food, and the environment can be examined from many points of interest and concern. The growing analytical significance of pesticide residues has resulted in a revolutionary development of techniques and methodology for detection, isolation, and quantitation of submicrogram levels of these products. The confirmed presence and identification of pesticide residues in our food and environment has increased the concern for toxicological significance of these barely detectable amounts. However vanishingly small and innocuous these amounts may be, they have become sufficiently significant to create endless regulatory concern and efforts to eliminate exposure of man and the environment to any unreasonable adverse effects. The pesticide residue chemist has evolved as an integral part of the total process. (Author abstract by permission)

80-1861. Cotrau, M. (Inst. Med. & Farm., Iasi, Romania) **Accidente in industria chimica. Episodul de la Seveso. [Accidents in the chemical industry. The Seveso accident.]** *Rev. Ig. Bacteriol. Virusol. Parazitol. Epidemiol. Pneumoftiziol. Ig.* 28(8): 275-280; 1979 (7 references) (Rumanian).

Accidents in the chemical industry, including ex-

plosions and fires, are reviewed, and the 1976 Seveso accident is described. The Seveso accident involved the release of dioxin due to a mechanical malfunction in a 2,4,5-T production plant. The pollution was subsequently mapped on the basis of chromatographic analyses of samples. The most heavily polluted areas were evacuated permanently, and the buildings were demolished. Detergents were used for decontamination is less polluted zones.

80-1862. Menzie, C. M. (Div. Habitat Preserv. Res., US Fish & Wildl. Serv., Washington, DC, 20240) **Metabolism of pesticides. Update II.** *U.S. Fish Wildl. Serv. Spec. Sci. Rep. Wildl.* 212: 381 pp.; 1978 (1050 references).

This special report reviews data on the metabolism of 400 pesticides. A description of the experiments conducted and the findings of the studies are presented. Tests conducted on various soils, plants, animals, insects and microorganisms are included. Effects of the chemicals on the test organisms are given. Specific enzyme reactions with the chemicals are described.

80-1863. Werner, G. M.; Putnam, A. R. (Dep. Hortic. Pestic. Res. Cent., Michigan State Univ., East Lansing, MI 48824) **Differential atrazine tolerance within cucumber (*Cucumis sativus*).** *Weed Sci.* 28(2): 142-148; 1980 (30 references).

The cucumber (*Cucumis sativus* L., accession PI 390244) tolerated up to 0.56 kg/ha atrazine [2-chloro-4-(ethylamino)-6-(iso-propylamino)-*s*-triazine] whereas most cultivars and accessions were killed by 0.14 kg/ha. The possible mechanisms for tolerance were investigated by comparing growth rates, effects on photosystem II in isolated chloroplasts, and differencrs in uptake and translocation of ^{14}C-atrazine between tolerant PI 390244 and the susceptible cultivar Marketmore 70. PI 390244 had significantly more leaf area than Marketmore 70, but less root biomass. Isolated chloroplast preparations from both cultivars were equally susceptible to the herbicide. Although PI 390244 absorbed more total ^{14}C-atrazine, it translocated less radioactivity from the roots. While the concentration of ^{14}C found in the PI 390244 roots was 10-30% greater than in Marketmore 70, the amount of radioactivity in the cotyledons, and first and second true leaves of Marketmore 70 were 53, 34 and 55% higher, respectively, after 48 hr. (Author abstract by permission)

80-1864. Waddington, J. (Agric. Canada, Melfort, Saskatchewan SOE 1AO, Canada) **Chemical control of dandelion (*Taraxacum officinale*) and perennial sowthistle (*Sonchus arvensis*) in alfalfa (*Medicago sativa*) grown for seed.** *Weed Sci.* 28(2): 164-167; 1980 (9 references).

Applications of 2,4-D [(2,4-dichlorophenoxy) acetic acid] at 1.1 kg/ha at the start of each growing season severely damaged established alfalfa (*Medicago sativa* L. Beaver) and reduced seed yield 32% over a 4 yr period. Dandelion (*Taraxacum officinale* Weber) populations were reduced but perennial sowthistle (*Sonchus arvensis* L.) increased in frequency. Dichlobenil (2,6-dichlorobenzonitrile) applied at 2.2 kg/ha controlled both dandelion and perennial sowthistle. Alfalfa was damaged initially but rapid recovery resulted in an increase in seed yield in 2 yr out of 4. Terbacil (3-*tert*-butyl-5-chloro-6-methyl uracil) applied at 1.1 hg/ha controlled dandelion and perennial sowthistle. No alfalfa damage was evident and seed yields were increased 34% over a 3 yr period. Seed yield increased 30% where asulam (methyl sulfanilylcarbamate) was applied at 4.5 kg/ha, but there was no visible effect on the growth of either alfalfa or weeds. Simazine [2-chloro-4,6-*bis*(ethylamino)-*s*-triazine], propham (isopropylcarbanilate) + PCMC (*p*-chlorophenyl-*N*-methyl carbamate), pronamide [3,5-dichloro-(*N*-1,1-dimethyl 2-propynil)benzamide], and diuron [3-(3,4-dichlorophenyl)-1,1-dimethylurea], did not affect alfalfa seed production significantly, although simazine and diuron did reduce dandelion populations. (Author abstract by permission)

80-1865. Deal, L. M.; Hess F. D. (Dep. Bot., Purdue Univ., West Lafayette, IN 47907) **An analysis of the growth inhibitory characteristics of alachlor and metolachlor.** *Weed Sci.* 28(2): 168-175; 1980 (29 references).

The effects of varying concentrations and duration of alachlor[2-chloro-2',6'-diethyl-*N*-(methoxy-methyl) acet-anilide] and metolachlor[2-chloro-*N*-(2-ethyl-6-methyl-phenyl)-*N*-(2-methoxy-1-methylethyl)acetamide] treatment on root growth, cell division, and cell enlargement were studied. Peas (*Pisum sativum* L. Alaska) and oats (*Avena sativa* L. Victory) were treated from 0 to 48 hr with concentrations ranging from 1×10^{-8} to 1×10^{-3} *M* of each herbicide. After 48 hr, average growth rates were significantly inhibited at concentrations of 1×10^{-7} *M* alachlor and 5×10^{-8} *M* metolachlor, and 5×10^{-7} *M* alachlor and 1×10^{-6} *M* metolachlor for peas and oats, respectively. When growth inhibitions were examined across time at concentrations greater than these, the degree of growth inhibition was a function of both concentration and duration of treatment. Often the greatest decrease in growth occurred between 0 and 12 hr. Mitotic indices of root tip squashes from pea roots and paraffin sections from oat roots were determined. There was a significant reduction in the mitotic indices of pea roots treated for 48 hr with 5×10^{-6} *M* alachlor or 1×10^{-5} *M* metolachlor. After a 30 hr treatment, the mitotic indices of oat roots were significantly reduced by 1×10^{-7} *M* metolachlor and 1×10^{-5} *M* metolachlor (30%). Inhibition of pea hypocotyl elongation did not occur at concentrations below 5×10^{-4} *M*. It was concluded that the growth inhibition of plants caused by alachlor and metolachlor results from both an inhibition

of cell division and cell enlargement. (Author abstract by permission)

80-1866. Rice, R. P. Jr.; Putnam, A. R. (Dep. Ornament. Hortic., California Polytech. State Univ., San Luis Obispo, CA 93407) **Environmental influences on the selectivity of diphenamid in seeded tomato (*Lycopersicon esculentum*).** *Weed Sci.* 28(2): 176-180; 1980 (16 references).

Several environmental and edaphic factors were monitored to determine their association with tolerance of seeded tomatoes (*Lycopersicon esculentum* Mill.) to diphenamid (*N,N*-dimethyl-2,2-diphenylacetamide). Injury increased with increasing soil pH and reduced temperature within 7 days of seeding in both field and growth chamber tests. The application of soluble fertilizer and diphenamid at planting acted synergistically to increase tomato injury. Prior to emergence of the tomato seedlings, ^{14}C-diphenamid uptake was slight but increased with higher temperatures, while growth was inhibited at both low and high temperatures. Uptake and metabolism of ^{14}C-diphenamid by plants in the cotyledon stage was not greatly affected by temperature or pH; however, translocation from the root to the shoot was reduced under low temperatures and high pH. These differences in translocation paralleled reported differences between tolerant and susceptible species, and may account for the increased diphenamid injury to tomatoes grown under stress conditions. (Author abstract by permission)

80-1867. Pritchard, M. K.; Warren, G. F. (Dep. Plant Sci., Univ. Manitoba, Winnipeg, Canada) **Effect of light on the response of tomato (*Lycopersicon esculentum*) and two weed species to metribuzin.** *Weed Sci.* 28(2): 186-187; 1980 (16 references).

The response of tomato (*Lycopersicon esculentum* Mill, Chico III), jimsonweed (*Datura stramonium* L.), and velvetleaf (*Abutilon theophrasti* Medic.) to postemergence applications of metribuzin[4-amino-6-*tert*-butyl-3-(methylthio)-*as*-triazin-5(4*H*)-one] applied after cloudy weather was determined by shading the plants artificially before field application of the herbicide. One day of 76% actual shade reduced the tolerance of tomato, jimsonweed, and velvetleaf to metribuzin, and 3 days of shade further reduced plant tolerance to the herbicide. The GR50 values showed that tomato was about 30 times more tolerant than jimsonweed and about 40 times more tolerant than velvetleaf to metribuzin. After 3 days of shade, 2 or 3 days of sunshine were required to return tomato to its full tolerance to metribuzin. After 3 days of cloudy weather, metribuzin applied at about 55% of the normal dose should control jimsonweed and velvetleaf. Weather conditions before postemergence applications of metribuzin will determine the appropriate timing of application and the herbicide dose. (Author abstract by permission)

80-1868. Shearman, R. C.; Kinbacher, E. J.; Reierson, K. A. (Dep. Hortic., Univ. Nebraska, Lincoln, NE 68583) **Siduron effects on tall fescue (*Festuca arundinacea*) emergence, growth, and high temperature injury.** *Weed Sci.* 28(2): 194-196; 1980 (12 references).

Spring establishment of tall fescue (*Festuca arundinacea* Schreb, Kentucky 31) is preferred over fall for turfs in Nebraska. Siduron[1-(2-methylcyclohexyl)-3-phenylurea] is commonly used for weed control in spring seeded tall fescue. Siduron application rates of 6.8, 13.6, 27.2 and 40.8 kg/ha were compared with in untreated control in this study. All siduron applications reduced stand development. The 6.8 kg/ha rate nearly doubled the number of days for seedling emergence. Abnormal seedlings increased with increasing application rates and percent germination decreased with increased rates. Tiller number declined at rates of 13.6 kg/ha and above. Plants treated with 6.8 kg/ha were 1.3 cm shorter than those growing in the untreated control. Plant and root dry matter production decreased with increasing application rates. Root weight was reduced more than plant weight. Degree of wilting and drought injury increased at 13.6 kg/ha. Water use declined with increased siduron application rates. The amount of water lost before wilting occurred also declined as siduron application rates increased. High temperature injury on seedlings was reduced with increasing rates of siduron. Reduction in high temperature injury was significantly correlated ($r = 0.98$) to reduced plant tissue moisture. (Author abstract by permission)

80-1869. Campanini, G.; Ghetti, P. F.; Gorbi, J. (Ist. Ispezione Aliment., Univ. Parma, Parma, Italy) **Utilizzione delle comunita dei macroinvertebrati acquatici come indicatori del carico in pesticidi organoclorurati del territorio. [Use of aquatic macroinvertebrate communities as indicators for the content of organochlorinated pesticides in the environment.]** *Acqua Aria* (1): 15-22; 1979 (23 references) (Italian).

Five sampling stations in the hydro-network of Val Parma (Italy) were used to study chlorinated hydrocarbon levels in the macroinvertebrates populating the streams. Val Parma was chosen as representative of median pesticide contamination of Italian streams. The populations included insects, Oligochaeta, Hirundinea, Crustacea, Gastropoda and Lamellibranchiata. The median concentrations over 17 mo in ppb of α, β, γ and δ-BHC, heptachlor epoxide, aldrin, dieldrin, DDE, DDT and DDD (TDE) were tabulated. The concentrations were found to increase with distance from the source of the streams and varied with the seasons. The lipid content of the species varied from 1.63 to 8.57%. The pesticide content in lipids ranged from 0.5 to 125 ppb. Water was contaminated by $\sim$0.1 ppb.

80-1870. Ferreira, J. R.; Filho, H. B.; Krug, J. F.; Menezes, N. A.; Hansen, P. E.; Jorgensen, S. S. (Inst. Pesca, Coord. Pesquisa Recursos Nat., 11 100 Santos SP, Brazil) **Mercury in water and fish from the Sao Vicente estuary near Santos, Brazil.** *Ambio* 8(5): 210-213; 1979 (29 references).

The mercury content was determined for fish and water samples collected from 3 sites in the Sao Vicente estuary in Brazil, about 30 km downstream from the outlets of an industrial region. Sampling was performed several times monthly during April-July 1976. Total mercury was determined in water and fish samples by substoichiometric radioisotope dilution analysis. Mercury in the water samples ranged from 0.01 to 10.0 μg/l. The averages for the three sampling sites were 2.14, 1.80 and 1.66 μg/l. In 90% of the fish collected mercury was detected in the muscle at concentrations around 50 μg/kg. Ten percent of the fish had mercury levels ranging from 170 to 860 μg/kg. Most of the fish had mercury contents comparable to those found in fish from unpolluted tropical waters. However, statistical analysis indicates the presence of a non-steady state, and it is suggested that mercury levels will continue to increase in the fish unless pollution is abated.

80-1871. Anderson, J. P. E.; Domsch, K. H. (Inst. Bodenbiol., Bundesforschungsanst. Landwirtsch., D-3300 Braunschweig, BRD) **Relationship between herbicide concentration and the rates of enzymatic degradation of ^{14}C-diallate and ^{14}C-triallate in soil.** *Arch. Environ. Contam. Toxicol.* 9(3): 259-268; 1980 (19 references).

The influence of concentration on the rates, routes and patterns of loss of [carbonyl-^{14}C] diallate and [allyl-2-^{14}C] triallate from an agricultural soil was studied in the laboratory for up to 52 wk using an incubation system that allowed 95-98% recoveries of the added ^{14}C. Based on comparison of half-lives, diallate was dissipated from soil at 3 to 4 times the rate of triallate at all 5 concentrations (0.25-50 μg/g) tested. The major routes of loss, in descending order of importance, were degradation, bound residue formation, and volatilization. With both herbicides, $^{14}CO_2$ was the only degradation product identified; however, large quantities of bound residue and traces of benzene- and water-soluble radioactivity were also detected. Evidence for the biodegradability of the bound residue of diallate was given. Although dissipation rates could not be described by zero-, half-, first-, or second-order kinetics, a reaction order between first- and second- was indicated. Enzymatic material in the soil had the potential to degrade at least 1 μg/g diallate within 24 hr and 0.5 μg/g triallate within 72 hr. However, when these quantities of herbicide were applied as initial dosages to the soil, measurable amounts of the parent molecules could be detected after 30 (diallate) and 52 (triallate) wk of incubation. It was concluded that a primary factor influencing the rates of enzymatic degradation of herbicides in the soil is a physical separation of the herbicide molecules and the enzymes systems responsible for degradation. (Author abstract by permission)

80-1872. Hughes, D. N.; Boyer, M. G.*; Papst, M. H.; Fowle, C. D.; Rees, G. A. V.; Baulu, P. (Dep. Biol., York Univ., Downsview, Ontario M3J 1P3, Canada) **Persistence of three organophosphorus insecticides in artificial ponds and some biological implications.** *Arch. Environ. Contam. Toxicol.* 9(3): 269-279; 1980 (24 references).

The persistence and biological impact of the organophosphorus insecticides, Abate (temephos), Reldan (chlorpyrifos-methyl), and Dursban (chlorpyrifos), were studied following the application of 10 ppb to a series of artificial polyethylene-lined ponds and a single natural pond inoculated with leaf litter. Disappearance of the insecticides from water could be described in terms of 2 phases: early post-treatment, in which rapid partitioning took place; and, a variable time period, characterized by slowly decreasing residues. Of the 3 pesticides, Dursban was the most persistent followed by Reldan and Abate in that order. The rapid initial disappearance of the pesticides from water was primarily attributable to adsorption on bottom sediments and polyethylene. Polyethylene appeared to have a greater affinity for the pesticides than did the sediments. However, desorption from the polyethylene contributed to residual concentrations in the water of artificial ponds for prolonged periods. Dursban was most toxic to cladoceran and copepod populations. Cladocerans were more sensitive to the 3 insecticides than were cyclopod and calanoid copepods or copepod nauplii. Chlorophyll concentrations as a measure of algal biomass were always

greater in ponds treated with Abate or Dursban than in untreated ponds, supporting the conclusion that algal blooms result from the elimination of zooplankton predation. It was concluded that in artificial polyethylene-lined ponds residues persisted for longer times than in natural ponds. The resulting prolonged periods in which zooplankton were absent leads to an increased probability of algal blooms. (Author abstract by permission)

80-1873. Miller, C. S.; Hoover, W. L.; Culver, W. H. (Dep. Plant Sci., Texas A&M Univ., College Station, TX) **Exposure of pesticide applicators to arsenic acid.** *Arch. Environ. Contam. Toxicol.* 9(3): 281-288; 1980 (10 references).

The arsenic content of long-sleeved coveralls worn by ground rig drivers, pilots, and ground crew members averaged 430, 260 and 348 mg of arsenic, respectively after being worn during the normal pursuit of the application of arsenic acid as a desiccant on cotton in Texas and Oklahoma. The average arsenic content in breathing zone air for ground rig applicators was 7.8 μg As/m^3 during the application. The applicators coveralls received only about 0.1 to 50 ml of the applied spray. The results will aid in the determination of preliminary hazards of exposure to arsenic acid spray when the expected absorption percentage of arsenic from clothing and bare skin is determined at some future date. (Author abstract by permission)

80-1874. Geller, A. (Fak. Biol., Univ. Konstanz, D-7750 Konstanz, BRD) **Studies on the degradation of atrazine by bacterial communities enriched from various biotopes.** *Arch. Environ. Contam. Toxicol.* 9(3): 289-305; 1980 (37 references).

Degradation of ^{14}C-ring labeled atrazine by bacterial populations from soil, waters and activated sludges was investigated and compared with non-biological decomposition in sterile solutions. Within 2 wk, 0.6% Cl-deethyl- and 0.1% Cl-deisopropylatrazine had been formed in sterile 0.02 *M* phosphate buffer, pH 7.2. In biodegradation studies, bacterial populations were enriched and incubated in media containing atrazine and high or low levels of nutrients. Nutrient supply had a strong effect on the fate of atrazine and high or low levels of nutrients. Nutrient supply had a strong effect on the fate of atrazine in bacterial cultures, whereas the origin of bacteria was of minor importance. In 31 of 33 mixed populations investigated, the herbicide was largely converted to unidentified compounds. Incubation with high levels of nutrients resulted in 17% to 57% after 1 wk. The proportions of the unidentified compounds dropped within the second wk of incubation, while atrazine reappeared correspondingly. The amounts of dealkylated metabolites generally did not exceed those of sterile solutions. The results indicate that atrazine is not degraded by bacteria but bound, thus simulating biodegradation. Evidence is presented that physicochemical decomposition of the herbicide is more significant than microbial degradation. (Author abstract by permission)

80-1875. Serrano-Caballero, J. M.; Garcia-Roman, A.; Santiago-Laguna, D.; Infante-Miranda, F. (Catedra Farmacol. & Toxicol., Fac. Vet., Univ. Cordoba, Cordoba, Spain) **Residuos de pesticidas organoclorados en yema de huevo. II. Huevos con cubierta calcerea fracturada. [Organochlorine pesticide residues in egg yolk. II. Broken-shell eggs.]** *Arch. Zootec.* 28(109): 95-101; 1979 (2 references) (Spanish).

Egg yolks from eggs whose shells were broken during transport and handling were assayed for organochlorine pesticide residues. Fifty samples were tested. Lindane, heptachlor, aldrin, dieldrin, p,p′-DDE, p,p′-TDE and p,p′-DDT were found in 14, 30, 36, 46, 50, 15 and 48 of the samples, respectively. The average concentrations were 0.18, 0.18, 0.091, 0.18, 0.032, 0.45 and 0.22 ppm, respectively. In general, the pesticide levels were higher in eggs with broken shells than in normal eggs.

80-1876. Serrano Caballero, J. M.; Garcia Roman, A.; Santiago Laguna, D.; Infante Miranda, F. (Catedra Farmacol. & Toxicol., Fac. Vet., Univ. Cordoba, Cordoba, Spain) **Residuos de pesticidas organoclorados en yema de huevo. [Organochlorine pesticide residues in egg yolk.]** *Arch. Zootec.* 28(110): 137-142; 1979 (15 references) (Spanish).

Lindane, heptachlor, aldrin, dieldrin, DDE, TDE and DDT levels in fifty egg yolks collected in October to December 1975 from the local market in the Cordoba, Spain were determined. The individual contaminants were found in 6, 8, 38, 49, 49, 6 and 49 eggs of the 50 samples respectively. The average median contents were: 0.1, 0.01, 0.087, 0.08, 0.034, 0.02 and 0.17 ppm respectively.

80-1877. Olsen, P.; Olsen, J. (Div. Wildl. Res., CSIRO, Lyneham, A. C. T. 2602, Australia) **Eggshell thinning in the peregrine, *Falco peregrinus* (Aves: Falconidae), in Australia.** *Aust. Wildl. Res.* 6(2): 217-226; 1979 (28 references).

Eggs of 472 Australian peregrine falcons from museum and private collections, and a few from field studies, were examined for significant differences in shell thickness in eggs laid before and after 1947. Length (*l*, in mm), breadth (*b*, in mm), and weight (*w*, in mg) were measured and used to calculate the thickness index, RI. These data were then analyzed for significant differences by standard analysis of variance tests. No significant differences among the thickness indices for pre-1947 eggs were noted. Post-1947 *w* and RI measurements were significantly less than pre-1947 measurements ($p < 0.001$). Mean egg shell thicknesses from 1949-1958, 1959-1968, and 1969-

1978 were 10.4%, 8.3% and 11.4%, respectively, less than the pre-1947 mean. DDT use in Australia is associated with the degree of thinning observed; areas where DDT was and is used gave the highest percent reduction in eggshell thickness.

80-1878. Verstraete, W.; Stryckers, J.; Cadron, J.; Van Himme, M.; Bulcke, R. (Fac. Sci. Agron., Univ. Etat, Gent, Belgium) **Les Herbicides en culture betteraviere: postaction et effets sur la flore microbienne du sol. [Side effects of herbicides on the soil microbiota in beet crops.]** *Belg. Inst. Verbetering. Beit Driemaand. Publ.* 47(11): 69-87; 1979 (31 references) (Multilingual).

The persistence and biological effect of pyrazone (chloridazon), ethofumesate, and metamitron were studied during the extremely dry growing season of 1976 by bioassays and chemical residue analyses of soil samples. Residues of ethofumesate (1500 g/ha applied immediately after drilling) were present in considerable amounts at harvest. Bioassays also revealed a slight inhibition of flax plants grown in metamitron and pyrazone treated plots. Seven wk after application metamitron and pyrazone had pronounced adverse effects on the total microbial enzymatic activity of the soil: ethofumesate had a less marked effect. When beet plants were fully grown and covered the soil completely, the impact of pyrazone was lowered and pyrazone residues disappeared completely by harvest. Metamitron and ethofumesate persisted until the beets were harvested. Pyrazone (2500 g/ha) and metamitron (5000 g/ha) increased the maximum enzymatic reaction rate (V_m) of phosphatase; ethofumesate (1500 g/ha) reduced the V_m value. Pyrazone and ethofumesate had positive effects on the Michaelis-Menton constant (K_m) of the phosphatase activity; metamitron had no adverse effect on the K_m value. The herbicides had no noticeable effect on the total biomass. [This article is written in both French and Dutch.]

80-1879. Verstraete, W.; Stryckers, J.; Cadron, J.; Van Himme, M.; Bulcke, R. (Fac. Sci. Agron., Univ. Etat, Gent, Belgium) **Effets secondaires des herbicides utilises en culture betteraviere sur la faune microbienne du sol. Evaluation des resultats de 1977. [Side effects of herbicides on the soil microbiota in beet crops. Evaluation of the 1977 results.]** *Belg. Inst. Verbetering. Beit Driemaand.* 47(11): 89-98; 1979 (8 references) (Multilingual).

The soil microbial activity effect of metamitron (5000 g/ha; treatment 1), chloridazone (2500 g/ha; treatment 2), ethofumesate (1500 g/ha; treatment 3), phenmedipham (1000 g/ha; treatment 4) and ethofumesate + phenmedipham (750 + 1000 g/ha, respectively; treatment 5) were studied in sandy clay and sandy loam soils. All herbicides had transient adverse effects on soil microorganisms shortly after application. The rate of nitrification was decreased considerably at 2 wk in both soils by treatment 1 and in the sandy loam by treatment 4. In sandy clay, the ATP level was markedly reduced by treatments 1, 2, 3, and 4 at 2 wk after application and by treatments 1, 2, and 4 at beet harvest. In sandy loam soils the ATP level was markedly reduced by treatments 1, 2, and 4 at 2 wk and by treatments 1 and 4 at harvest. The phosphatase activity was generally in the normal range in both soils at harvest. Phenmedipham, ethofumesate, chloridazon, and metamitron, in this order, increasingly inhibited soil microbial activity. [This article is written in both French and Dutch.]

80-1880. Klein, W.; Scheunert, I. (Inst. Okol. Chem. Ges. Strahlen & Unweltforschung mbH Muenchen, Neuherberg, BRD) **Fate of chlorinated pesticides in the soil/plant system.** *Ber. Kernforschungsanlage Juelich* 1534: 50-70; 1978 (29 references).

A review is presented of qualitative and quantitative aspects of the fate of chlorinated pesticides in the soil/plant system. It is suggested that it is necessary to study not only residues of the parent compound, but also conversion products found within the systems. Metabolic pathways of pesticides within the soil/plant system are discussed, along with possible reaction mechanisms. The conversion pathways of aldrin, lindane, DDT, and pentachloronitrobenzene (quintozene) are discussed in detail. The quantitative aspects of uptake, conversion rates and balances, and their dependence on experimental conditions and on time are also discussed. Field experiments on aldrin are presented as an example of long term studies on qualitative residue assessment.

80-1881. Fuehr, F. (Arbeitsgruppe Radioagron., Kernforschungsanlage Juelich GmbH, Juelich, BRD) **The uptake of pesticides by treated plants and rotational crops - bioavailability of bound residues.** *Ber. Kernforschungsanlage Juelich* 1534: 71-78; 1978 (5 references).

Field and laboratory studies were performed to determine the amount of pesticide uptake by treated plants and by untreated plants grown later in the same soil. Several factors that affect the results of laboratory studies are mentioned, including the distribution of pesticides in the soil, the ratio of root mass to soil, the maintenance of optimal soil water content for plant roots, steady water supply, and optimal conditions for plant growth and high transpiration rates. In the laboratory, 2-wk-old maize seedlings were planted and grown for 6 wk. ^{14}C-methabenzthiazuron was applied to the soil. At the end of the study 11.4% of the pesticide was recovered in the corn. In a parallel experiment, the same pesticide was applied to a field plot of wheat at 2.5 kg/ha. After 111 days, 1.4% of the pesticide was recovered in the wheat; 83% of the ^{14}C activity was still present in the soil. Similar studies on beets showed that plants grown in pots under greenhouse conditions took up 64% of Isocarbamid, while

plants grown in the field took up only 4.4% of the pesticide. Untreated plants grown in the treated soils used in the first part of the study contained 10% of the radioactivity recovered from the treated plants. It is concluded that pesticides are found in untreated rotational crops when fields were previously treated.

80-1882. Kerpen, W. (Arbeitsgruppe Radioagron. Kernforschungsanlage Juelich GmbH, Juelich, BRD) **Adsorption and desorption of soil applied pesticides and their importance for field application.** *Ber. Kernforschungsanlage Juelich* 1534: 79-88; 1978 (7 references).

Methabenzthiazuron, metamitron and metribuzin were applied at 5 μg/g soil and their adsorption and desorption on soils were investigated. Sorption was studied in stainless steel tubes to prevent loss of pesticides to the container walls. For adsorption the pesticides were radiolabeled, applied in solution to the soil and, after shaking, the tubes were centrifuged, and the supernatant withdrawn. The amount of pesticide remaining in solution was determined by scintillation spectrometry and the amount adsorbed was calculated by subtraction. For desorption, distilled water was added to soil with adsorbed pesticide and the above procedure was then used. The absorption range (as a percent of the amount applied) for methabenzthiazuron was 17-85%, for metamitron 5-44% and for metribuzin 2-19%. Of the adsorbed methabenzthiazuron 27-91% could be desorbed over 5 cycles, and for metribuzin and metamitron > 70% was desorbed. The effect of soil characteristics on adsorption and desorption are reviewed and a calculation for determining field application rates utilizing the adsorption values is presented.

80-1883. Langner, H. J.; Goeltenboth, R. (Zool. Garten Berlin, Berlin, BRD) **Der Gehalt an chlorierten Kohlenwasserstoff Pestiziden im Korperfett einiger Meeressaeuger und Pinguine aus dem Zoo Berlin. [Chlorinated hydrocarbon pesticide levels in the fatty tissues of seals and penguins of the Berlin Zoo.]** *Berl. Muench. Tieraerztl. Wochenschr.* 92(10): 202-204; 1979 (3 references) (German).

High levels of PCBs and DDE were found in fatty tissues of several marine mammals and one penguin in the Berlin Zoo. A report is also given of the death of a newborn seal which was traced to the presence of chlorinated hydrocarbons in mother and baby seal fatty tissues. The fish used as feed contained comparatively large amounts of DDE, 2,4-DDT, DDD (TDE) and DDT, but were concluded to explain only in part the very high levels of pesticides in the examined animals. Baikal seal fat contained 25.3 ppm PCB and 13.4 ppm DDE. A similarly high DDE content was found in fatty tissues of a South African polar bear. No explanation for these findings is given.

80-1884. Battikhi, M. N. G.; Leach, C. K. (Sch. Life Sci., Leicester Polytechnic, Leicester LD1 9BH, England) **The lack of inhibition of nitrogenases of aerobic bacteria by the contact herbicide dinoseb.** *Biochem. Soc. Trans.* 8(2): 185-186; 1980 (7 references).

Cultures of aerobic nitrogen-fixing organisms were exposed to concentrations of dinoseb ranging from 5 to 400 ppm. Low concentrations had little effect on *Azotobacter vinelandii* N.C.I.B. 8789 and *Azomonas macerocytogenes* N.C.I.B. 10958, and were without effect on *Azomonas agilis* N.C.I.B. 9434 and *Azotobacter vinelandii* (Leach). Acetylene reduction was increased by *Azotobacter vinelandii* N.C.I.B. and *Beijerinckia fluminensis* N.C.I.B. 9879. It is concluded that dinoseb is not a potent inhibitor of nitrogenase activity in aerobic bacteria.

80-1885. Hance, R. J. (Agric. Res. Counc., Weed Res. Org., Begbroke Hill, Yarnton, Oxford OX5 1PF, England) **Herbicides and the soil.** *Chem. Br.* 16(3): 128, 130, 131, 156; 1980 (15 references).

A discussion is presented of some of the principles of herbicide-soil interactions. Of interest are the factors controlling the herbicide concentrations in soil water and in soil air, since these are the factors related to biological availability. It is pointed out that the physico-chemical characteristics involved in herbicide uptake by germinating or newly emerged weeds are not entirely the same as those for systemic insecticides or fungicide uptake by larger plants. Adsorption controls herbicide concentrations in soil solution under equilibrium conditions, and various adsorption mechanisms are considered. Chemi-sorption, hydrophobic bonding, transport and non-biological and biological transformations are discussed. Laboratory investigations on both microflora and fauna are suggested to be of limited value because the natural fluctuations in numbers and activities of organisms are so high, both with time and from place to place in the same field, that it is difficult to define a significant change.

80-1886. Metcalfe, C. D.; McLeese, D. W.; Zitko, V. (Fish. & Environ. Sci., Biol. Stn., Dep. Fish. & Oceans, St. Andrews, New Brunswick, E0G 2X0, Canada) **Rate of volatilization of fenitrothion from fresh water.** *Chemosphere* 9(3): 151-155; 1980 (16 references).

The volatilization and aeration rates of fenitrothion and methyl parathion were determined in dechlorinated laboratory tap water. The volatilization of fenitrothion in lake water samples collected from surface and bottom waters of Palfrey Lake and at the Palfrey Brook and Lake confluence were also determined. The dissolved oxygen was removed from the laboratory samples and were then spiked with 1.5 ppb fenitrothion or methyl parathion. Over a period of 144 hr the dissolved oxygen concentration did not increase and fenitrothion concentrations did not decrease in stoppered stationary flasks. A direct relationship between the rate of volatilization and the rate of aeration was noted with increased agitation. The

volatilization of methyl parathion was an order of magnitude lower than that found for fenitrothion. Fenitrothion concentrations in the confluence water samples reached 1.89 ppb immediately post-spray and then rapidly disappeared over the next 2 days. Concentrations in the lake samples were lower but remained over 1 mo. The rates of disappearance were calculated and compared to the laboratory values. The fenitrothion volatilization rates in the lake samples were within the range of the laboratory values but the disappearance rate at the brook lake confluence were considerably higher than laboratory values.

80-1887. Jan, J. (Public Health Inst. Slovenia, Ljubljana, Yugoslavia) **Chlorinated benzene residues in some seeds.** *Chemosphere* 9(3): 165-167; 1980 (10 references).

Chlorinated benzene (CB) residues were investigated in walnuts and corn, rape, sunflower and poppy seeds from Yugoslavia; hazelnuts from Turkey; peanuts and sesame seeds from China; and soybeans from the United States. The sum of the di-, tri-, tetra-, penta- and hexa-CB residues in all samples tested were generally 2 orders of magnitude greater than the level of total HCH (ΣBHC) residues found. Factors responsible for the variation in the amounts of CB residues found include the agricultural use of lindane, biotransformation differences in the different plants, differing soil and weather conditions, and other environmental phenomena.

80-1888. Fournier, J. C. (Lab. Microbiol. Sols, Inst. Natl. Rech. Agron., F-21034 Dijon Cedex, France) **Enumeration of the soil micro-organisms able to degrade 2,4-D by metabolism or co-metabolism.** *Chemosphere* 9(3): 169-174; 1980 (14 references).

Most probable number (MPN) studies on soil microflora capable of utilizing 2,4-D as the main carbon source [metabolizing microorganisms (MO)] and on those capable of degrading 2,4-D in the presence of other carbon sources [co-metabolizing microorganisms (CMO)] were performed. Unlabeled 2,4-D was added at 1.2 μg, 5 mg, 0.05 g or 0.5 g/l to an inorganic salts medium for MOs and to a medium containing 0.2 g organic carbon/l for CMOs. Labeled 2,4-D was then added at 0.30 μCi/l, the pH was adjusted to 7, 5 ml of media were placed in each tube and the tubes were autoclaved. After serial dilutions of 10 g soil samples, 1 ml was inoculated into each tube, and they were then incubated for 60 days at 20°C. Pesticide degradation was determined by a colorimetric method and by scintillation counting. The number of CMOs found represented about 1% of the total microflora. A slight increase in the number of MOs were observed at the 3 lowest concentrations, however the highest 2,4-D concentration led to increased toxicity. At 0.05 g 2,4-D/l, MPNs ranged from 130 to 350 MOs/g soil and from 9 to 20 CMOs/g soil.

80-1889. Anderegg, B. N. (Univ. Wisconsin, Madison, WI) **Uptake, metabolism, and effects of ^{14}C labeled insecticides in C_3 and C_4 plants under different environmental conditions.** *Diss. Abstr. Int. B* 40(9): 4183; 1980.

Various C_3 and C_4 plants were grown in ^{14}C phorate treated soil to study the water transpired, the ^{14}C insecticide uptake by these plants, and the metabolism of the pesticide by plant tissues. The C_4 plants were found to take up less ^{14}C phorate residues from the soil than the C_3 plants. Autoradiographs of corn grown in ^{14}C phorate treated soil indicated that phorate was an apoplastic insecticide; it was transported in the xylem along with the transpiration stream. The effects of temperature and light intensity relative to water transpiration and ^{14}C phorate residues accumulated by plants was studied in oats (C_3), peas (C_3) and corn (C_4) grown at 16 different temperature and light intensity combinations. While both light intensity and temperature had an effect on the uptake of water and ^{14}C phorate residues by all three species, temperature exerted a greater influence than light intensity. To study the effects of temperature and light intensity on the total balance of ^{14}C phorate residues and $^{14}CO_2$ evolution in a closed system, cartons containing ^{14}C phorate treated soil and 25 oat plants each were placed under bell jars in 4 temperature and light intensity combinations. Total recoveries from all components of the closed system ranged from 85 to 90% of soil applied ^{14}C. To determine whether the $^{14}CO_2$ evolved was of plant or of soil origin, cartons containing ^{14}C phorate treated soil only were also tested. Results indicated that the $^{14}CO_2$ evolved was of soil origin. The effects of lindane on DNA, RNA, and protein synthesis in corn roots were also examined. Results indicated that the synthesis of DNA in roots may have been reduced due to the effects of the insecticide. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8001603)

80-1890. Fernandez-Quintanilla, C. (Univ. Illinois, Urbana Champaign, IL) **Microbial and chemical degradation of atrazine: two possible herbicide disposal methods.** *Diss. Abstr. Int. B* 40(9): 4593; 1980.

A microbial community consisting of 2 types of fungi and 4 different types of bacteria was isolated using an enrichment technique with atrazine acting as the selective force. This community was able to degrade up to 60% of ^{14}C labeled atrazine during a 9 wk incubation period. Microbial metabolism of atrazine resulted in the formation of dealkylated, hydroxylated, and non-extractable breakdown products. Field experiments conducted to evaluate various microbial degradation systems under large scale conditions showed that degradation of atrazine was better under aerobic than under partially anaerobic conditions. Only 50% of the original atrazine disappeared during a 9 wk incubation period. Chemical hydrolysis experiments showed that the rate of hydrolysis of atrazine was insignificant in sterile soil solutions at pH 3 and 30°C. Increasing the temperature to 60°C increased the rate of

reaction drastically. Treatment of atrazine with a strong acid (HCl) or alkali (NaOH) resulted in very high rates of chemical hydrolysis. The rate of atrazine disappearance from solution was dependent on the concentration of acid or alkali and on the concentration of atrazine. Complete degradation of atrazine in a 1 *N* HCl solution took less than 3 days with atrazine concentrations as high as 5000 ppm. Degradation of atrazine in a 0.1 *N* HCl solution was very slow at atrazine concentrations of 5000 ppm and it took almost 30 days for complete hydrolysis. The only degradation product formed was the non-phytotoxic hydroxyatrazine. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8009028)

80-1891. Rihan, T. I.; Mustafa, H. T.; Caldwell, G., Jr.; Frazier, L. (Rust College, Holly Springs, MI 38635) **Chlorinated pesticides in streams and lakes of northern Mississippi water.** *Egypt. J. Chem.* 19(6): 1123-1126; 1979 (1 reference).

Ten lakes and streams in Northern Mississippi, a primarily agricultural area, were sampled for analysis of pesticide residues. Water samples were taken at a depth of one foot, and analysis was carried out using a varian gas chromatograph with Ni63 electron capture detector. DDT concentrations ranged from 2.73 to 12.31 ng/l; aldrin concentrations ranged from 0.01 to 0.49 ng/l; heptachlor concentrations ranged from 0.03 to 0.18 ng/l, and lindane levels ranged from 0.02 to 0.16 ng/l.

80-1892. Visalakshi, A.; Ali, A. B. M.; Nair, M. R. G. K.; Mohandas, N. (Coll. Agric., Vellayani 695522, India) **Horizontal movement of phorate in different types of soil.** *Entomon* 4(2): 125-128; 1979 (6 references).

Results are reported on preliminary studies designed to determine the movement of the insecticide phorate in various soil types. Five types of soil (sandy, forest, laterite, red and alluvial) were collected and placed in trays, and the moisture level kept at field capacity. Cowpea seeds were planted, and when the seedlings were 1 wk old, 1 g of 10% phorate granules was placed in the center of the tray 5 cm deep and covered with soil. Phorate movement in the soil was determined from the mortality of *Aphis craccivora* adults confined on the seedlings on the 2nd, 3rd, 5th and 8th days after insecticide application. Results indicated that 1 day after treatment phorate had moved up to 60 cm, with the maximum movement in sandy soil, followed by forest, laterite, and red soils. No movement was indicated in alluvial soil after 1 day, but uptake was apparent after 2 days. Maximum movement of the insecticide took place during the first day of application. It is suggested that the low phorate movement in laterite, red and alluvial soils may be attributed to their clay contents, which exert an inactivating type of chemisorption. Suggested practical applications of the results include the use of smaller quantities of insecticides in sandy soils, and inter-row placement of phorate to benefit 2 rows of plants in sandy, forest, laterite or red soils.

80-1893. Venugopal, M. S.; Habeebullah, B.; Balasubramanian, M.; Subramaniam, T. R. (Dep. Agric. Entomol., Tamil Nadu Agric. Univ., Coimbatore 641 003, India) **Dimethoate residue in pepper (*Piper nigrum*).** *Entomon* 4(2): 213-214; 1979 (3 references).

Samples of green peppers sprayed with dimethoate (Rogor 30 EC) were analyzed for residues of the insecticide. Dimethoate (0.06, 0.10 or 0.15%) was sprayed once at the time of bearing during August 1978, and samples were collected 15 days later. Chemical assay and bioassay techniques were carried out. The residues were below detectable, 1.42 and 2.17 ppm for 0.06, 0.10 and 0.15% concentrations, respectively. By bioassay, a residue of 0.31 ppm was determined for the 0.15% concentration; residues were below the detectable level for the other concentrations. It is concluded that spraying of green peppers with Rogor 30 EC at a concentration at or below 0.1% is safe, resulting in a residue below the tolerance limit of 2 ppm.

80-1894. Kenaga, E. E. (Health & Environ. Sci., Dow Chem. Co., Midland, MI 48640) **Correlation of bioconcentration factors of chemicals in aquatic and terrestrial organisms with their physical and chemical properties.** *Environ. Sci. Technol.* 14(5): 553-556; 1980 (30 references).

Bioconcentration factors (BCFs) in fat tissues derived from dietary feeding studies in cattle for 23 (pesticidal) chemicals and in swine for 7 (organochlorine) chemicals were compared with BCFs derived from these chemicals in fish and found to be highly correlated, even though the BCFs were often several orders of magnitude lower in beef fat and swine. The difference in orders of magnitude of BCFs between fish and terrestrial mammals is due to the necessary use of different denominators to calculate BCFs. In spite of this difference in BCF values, absolute residue values in cattle, swine and fish are similar in magnitude. BCFs in beef fat are negatively correlated with water solubility, and are positively correlated with 1-octanol-water partition coefficients and soil organic carbon adsorption ratios as they are in fish. Regression equations were derived which are useful for prediction of any one value from another. BCF values for 7 chemicals in cattle and swine were found to be similar in magnitude. (Author abstract reprinted by permission of the American Chemical Society)

80-1895. Juszkiewicz, T. (Dep. Pharmacol. & Toxicol., Inst. Vet., P-24100 Pulawy, Poland) **Toksykologia srodowiskowa zagrozen przed i poporodowych. [Environmental toxicology and prenatal and postnatal risks.]** *Ginekol. Pol. Suppl.* (SPPL): 14-19; 1979 (Polish).

Environmental pollution by pesticides, PCBs, and heavy metals in Poland are reviewed. DDT levels in food products of animal origin and in animal tissues decreased during the period 1969-1976. Lindane residues occurred in a majority of animal and human tissues, while other organochlorine pesticides, β-BHC, hexachlorobenzene, *o,p'*-DDT, methoxychlor, and dieldrin occurred only sporadically and at very low levels. The average PCB levels found in Poland were 0.56 mg/kg in human fat, 0.36 mg/kg in human milk fat, 0.07 mg/kg in cow milk fat, 11.18 mg/kg in fish fat, 3.61 mg/kg in cat adipose tissues, and 1.61 mg/kg in rook adipose tissue.

80-1896. Krauthacker, B.; Alebic-Kolbah, T.; Kralj, M.; Tkalcevic, B.; Reiner, E.* (Dep. Biochem., Inst. Med. Res. & Occup. Health, 410000 Zagreb, Yugoslavia) **Organochlorine pesticides in blood serum of the general Yugoslav population and in occupationally exposed workers.** *Int. Arch. Occup. Environ. Health* 45(3): 217-220; 1980 (5 references).

Serum samples from members of the general population of 4 different locations of Yugoslavia and 2 groups of workers involved in the manufacture of organochlorine pesticides were analyzed for serum residues of *p,p'*-DDE, *p,p'*-DDT, *p,p'*-TDE, lindane, and α-BHC. *p,p'*-DDE was detected in all samples. Few samples from the general population contained α-BHC or lindane. A higher incidence and greater levels of pesticide residues were found in those working with the organochlorine compounds than were found in the general population. Pesticide residues levels in the serum samples of the general population of Yugoslavia were comparable to those of other countries.

80-1897. Bauer, S. R.; Wood, E. M.; Traxler, R. W.* (Univ. Rhode Island, Kingston, RI 02881) **Co-oxidation of 2,4-dichlorophenoxyacetate by *Pseudomonas* sp.** *Int. Biodeterior. Bull.* 15(2): 53-56; 1979 (13 references).

A *Pseudomonas* species was used in studies to determine the mechanisms of 2,4-D co-oxidation. Labeled and unlabeled 2,4-D sodium benzoate and cell suspension were placed in reaction flasks. At the end of the experiment, cells collected by centrifugation, cell-free culture supernatant and CO_2 traps were analyzed by liquid scintillation. Chloride ion release was determined, and 2,4-D was quantitated by gas chromatography. Results indicate that *Pseudomonas* used 2,4-D as a co-oxidizable substrate when growing on sodium benzoate. The p-chloro group was removed from the ring structure, and the acetate moiety of 2,4-D was removed. Radiochromatography indicated the formation of a co-oxidation product, a chlorinated benzene compound with at least one polar group and a lower molecular weight than 2,4-D.

80-1898. Neely, W. B. (Environ, Sci. Res., Dow Chem. Co., Midland, MI 48640) **Preliminary assessment of the environmental exposure to be expected from the addition of a chemical to a simulated aquatic ecosystem.** *Int. J. Environ. Stud.* 13(2): 101-108; 1979 (20 references).

A computer model of an aquatic ecosystem was designed to predict the maximum environmental concentration of chemicals in the ecosystem. Uptake rate constants (k_3) in fish were calculated and compared to experimentally determined values. Similarly the evaporation rate constant (k_1), soil uptake (k_4), soil release (k_2), bioconcentration factor (BF), the partition coefficient (PC) and fish excretion rate (k_4) were also determined. These values were then used to prepare a compartmental analysis for 12 chemicals added at 0.15 g/hr for 30 days followed by a 30 day clearance interval. Percent of total at 10 days in water, soil, air and fish were, respectively, 3.57, 39.4, 56 and 0.6 for hexachlorobenzene, 1.26, 67.5, 28 and 2.4 for DDT and 18, 72, 10 and 0.434 for chlorpyrifos. A chronic exposure ranking of the 12 chemicals was then calculated from the fish clearance half-life. DDT was ranked second; hexachlorobenzene, fourth; and chlorpyrifos, seventh. These rankings could be altered by further investigation of potential degradative mechanisms.

80-1899. McGrath, D.; McCormack, R. J. (Johnstown Castle Res. Cent., Wexford, Ireland) **Herbicide activities in Irish soils.** *Ir. J. Agric. Res.* 18(1): 89-96; 1979 (14 references).

Atrazine, chlorpropham, lenacil, linuron, pyrazon and trifluralin were applied to 13 soils with various properties at concentrations determined to be the ED50 values for oats and turnips. Soil-herbicide interactions under greenhouse conditions, in artificial plots and in sugar beet cultivated plots were examined. When soil organic matter extracts were used to amend the soil, the amount and type of organic matter were observed to exert strong influences on herbicide phytotoxicity. In the greenhouse experiments, the phytotoxicities of atrazine, chlorpropham and linuron, but not pyrazon, were strongly and negatively correlated with the presence of soil organic matter. The light absorbance of alkaline soil extracts were highly correlated with herbicide phytotoxicity. Texture and pH of the soils were not observed to have any effect on the phytotoxic properties of the herbicides. Suggestions to relate herbicide application rates to the amount of organic matter, rather than to soil texture, are presented.

80-1900. Liang, T. T.; Lichtenstein, E. P. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Effects of cover crops on the movement and fate of soil applied ^{14}C-fonofos in a soil-plant-water microcosm.** *J. Econ. Entomol.* 73(2): 204-210; 1980 (10 references).

The effects of corn plants or a lawn of ryegrass on the movement and metabolism of soil-applied ^{14}C-fonofos were studied in a microcosm which consisted of terrestrial and aquatic components. Artificial rain, applied to the

fallow or plant covered soils, resulted in runoff that accumulated in aquaria containing lake bottom mud and aquatic organisms. The presence and the type of a cover crop had a considerable effect on the mobility and metabolism of soil-applied ^{14}C-fonofos. The insecticide plus its metabolites were least persistent in systems with fallow soils and most persistent in those with ryegrass. Within the terrestrial soil, ^{14}C-compounds moved downwards and also were translocated via the roots systems into the leaves of corn and ryegrass. Within the plant tops, 86% of the recovered benzene-soluble ^{14}C-compounds were in the form of the detoxified methyl phenyl sulfone and 2% or less as fonofos. Due to rain, considerable runoff of soil and water had been deposited into all the aquaria, but the amounts of soil and ^{14}C transported decreased drastically due to the presence and nature of cover crops. ^{14}C-compounds transported were primarily associated with the runoff soil and most of these were later found in the soil-lake mud sediments. ^{14}C-fonofos was the major constituent in soils and aquatic sediments, while the major metabolites recovered from both the terrestrial and aquatic portion of the microcosm was methyl phenyl sulfone, its amounts ranging from 13 to 92% of all benzene-soluble radiocarbon. Relatively small amounts of the insecticidal oxygen analogue of fonofos were recovered, the exception being in roots of corn and ryegrass. (Author abstract by permission)

80-1901. Acher, A. J.; Saltzman, S. (Div. Soil Residues Chem., Inst. Soils & Water, Volcani Cent., Bet Dagan, Israel) **Dye-sensitized photooxidation of bromacil in water.** *J. Environ. Qual.* 9(2): 190-194; 1980 (17 references).

Irradiation of an aerated bromacil aqueous solution (250 ppm), by exposure to direct solar radiation in the presence of different dye sensitizers and an appropriate pH, led to complete and fast photodecomposition of the title compound. The photoreaction mixture spotted on TLC showed one major intermediate, 3-*sec*-butyl-2-acetyl-2-hydroxy-hydantoin. GLC showed another, minor, intermediate, the 5,5′-dimer photoproduct of 3-*sec*-butyl-6-methyl-uracil. The most effective dye sensitizers checked were riboflavin (10 ppm) and methylene blue (2-5 ppm). Less effective were rose bengal (5 ppm), humic acids (20 ppm), and chlorophyll (20 ppm). The rate of reaction was pH dependent, being faster at alkaline pH and almost negligible in acidic solutions. Under optimal experimental conditions the photooxidation was completed after about 1 hr, and further irradiation resulted in the decomposition of the intermediate products and the formation of unidentified polar products. (Author abstract by permission)

80-1902. Duseja, D. R.; Akunuri, H. V.; Holmes, E. E. (Dep. Plant Sci., Sch. Agric. & Home Econ., Tennessee State Univ., Nashville, TN) **Trifluralin soil behavior: persistence, movement and weed control.** *J. Environ. Sci. Health A* 15(1): 65-99; 1980 (18 references).

Studies were performed to demonstrate the persistence and movement of trifluralin in soil. The pesticide was applied in 1973 and 1976. At the time of the second application, there was no residual pesticide present. In each year, soil samples were taken once every month after initial application. The pesticide was applied at 0.75, 1.13 and 1.50 lb AI/acre (0.85, 1.28 and 1.70 kg/ha) rates on Egam soil and 1.0, 1.5 and 2.0 lb AI/acre (1.13, 1.70 and 2.26 kg/ha) on Beason soil. Levels of 0.815, 1.012, and 1.841 ppm were detected in Egam soil, and 1.377, 1.806 and 2.741 ppm were detected in Beason soil for the 3 application rates, respectively. Levels were about 7% higher than the residues found in the 1973 study. Differences in rainfall are believed to be responsible for some of the differences in recovery rates. The herbicide moved below the incorporation depth. Upward movement was observed in 1973, but not in 1976. Weed control and soybean yield in the studies were also compared.

80-1903. Singh, G. J. (Dep. Zool. & Comp. Physiol., Univ. Birmingham, Birmingham B15 2TT, England) **Effect of washing and mechanical trimming on insecticide residues in cabbage.** *J. Hortic. Sci.* 54(3): 243-245; 1979 (10 references).

Studies were carried out to evaluate the effects of washing and trimming of leaves on the diazinon and quinalphos residues in cabbage. Cabbage crops were sprayed with diazinon (125 g AI/ha) or quinalphos (250 g AI/ha) using a hand compression sprayer, and sample heads were selected at random 0.5 hr, 2, 4 and 8 days after application. The heads were trimmed to market standards and the removed wrapper leaves were retained. Samples were washed twice with running tap water and some heads were trimmed, which consisted of removing one additional layer of leaves. All heads and wrapper leaves were chopped and mixed separately; 50 g samples were analyzed. Washing was found to reduce diazinon residues by 49-61%, and quinalphos residues by 33-43%. Trimming an additional leaf layer reduced diazinon residues by 25-66% and quinalphos by 40-92%. It is suggested that a combination of washing and trimming can reduce the waiting period for both insecticides to about 4 days, which is half that required for unwashed and untrimmed heads.

80-1904. Kolesnikov, V. A.; Abramova, K. A.; Grib, O. K.; Borisov, G. S.; Sigaeva, V. A. (Sci. Res. Inst. Plant Growing, Moscow, USSR) **Primenenie gervitsidov na belokouannoi kapuste. [Use of herbicides on white cabbage.]** *Khim. Sel'sk. Khoz.* 17(10): 27-31; 1979 (7 references) (Russian).

The results of the trials of herbicides Semeron (desmetryne), Ramrod (propachlor), Treflan (trifluralin), and Nitrofor (2,6-dinitro-*N,N*- diethyl-4-trifluoromethyl-

alanine) in cabbage are presented. Ramrod retained herbicidal activity in soil for 21-23 days. Phytotoxicity of Treflan was retained for more than 3 mo in soddy-podzolic soil and for 20 days in peat soil. Concentrations of Treflan and Nitrofor in the soil 70 days after application comprised 12.5% and 3-4% of the initial amount, respectively. Inactivation of Ramrod in a 0-10 cm layer was completed for 23 days. Gas-liquid and thin-layer chromatographic determination of herbicides residues in the cabbage showed that 84-100 days after application of Treflan at 2.5 kg/ha, residues comprised only 0.006-0.011 mg/kg; there was no residues of Nitrofor applied at 4 kg/ha.

80-1905. Berezkina, G. E.; Kulik, L. V.; Gurova, Z. I.; Shuvaev, I. C.; Korzun, G. P. (Ukranian Sci. Res. Inst. Veg. & Melon Prod., Kharkov, USSR) **Primenenie gerbitsidov na tovarnykh i semennykh posevakh ogurtsov. [Use of herbicides on commercial and seed crop cucumbers.]** *Khim. Sel'sk. Khoz.* 17(10): 33-38; 1979 (8 references) (Russian).

The results of the trials of a series of herbicides in commercial and seed cucumber crops are presented. It was found that Nitrofor (2,6-dinitro-N,N-diethyl-4-trifluroomethylalanine), Amiben (chloramben), and preparation A-820 (butralin) did not affect the quality of cucumber seeds, or the chemical composition of the crop. Cucumbers did not contain residues of Nitrofor (applied at 1.8 kg/ha). Residues of Amiben (0.04-0.006 mg/kg) were within the permissible range. Residues of Diphenamid (0.1 mg/kg) were detected only after application at 8 kg/ha. Nitrofor (1.8 kg/ha), Amiben (1.8 kg/ha) and A-820 inhibited reproduction of soil microorganisms, but did not affect catalase activity.

80-1906. Konev, A. D. (Udmurt Agric. Exp. Stn., Izhvsk, USSR) **Primenenie simazina na bessmennykh posevakh kukuruzy. [Use of simazine in continuous corn crop.]** *Khim. Sel'sk. Khoz.* 17(12): 10-14; 1979 (13 references) (Russian).

The effect of simazine (2 or 4 kg/ha) on the soil and some parameters of continuous corn crop was studied. It was found that application of simazine increased the level of nitrates in the arable layer of the soil and increased the yield of green mass of corn by 98.4 centners/ha. Simazine did not have a negative effect on the quality of corn yield; there was a slight increase in the level of protein and fat in the corn.

80-1907. Sukhoruchenko, G. I.; Tolstova, Iu. S. (All-Union Inst. Plant Prot., Leningrad, USSR) **Dlitel'nost toksicheskogo deistviia insektoakaritsidov. [Duration of toxic effect of acaricides.]** *Khim. Sel'sk. Khoz.* 17(12): 24-28; 1979 (5 references) (Russian).

Various aspects of persistence of acaricides are discussed, with special attention to the mechanism of selective activity of polyvalent compounds. Treatment of entomo- and phytophages with carbamate, organophosphorus, and organochlorine insecticides showed rapid loss of toxicity of organophosphorus insecticides. Insecticides retained optimal toxicity for phytophages for 2 wk, while losing the toxicity for beneficial insects.

80-1908. Strekozov, B. P.; Gryzlova, G. K.; Chimishkian, A. L.; Kostovska, B.; Rolia, J., Sadovski, E.; Maniara, G. (Inst. Agrochem. & Soil Sci., Pushchino, USSR) **O prevrashcheniiakh gerbitsidov v vode, vozdukhe i pochve. [Transformation of herbicides in water, air, and soil.]** *Khim. Sel'sk. Khoz.* 17(12): 28-31; 1979 (7 references) (Russian).

The rate of degradation of a series of herbicides in the water, air, and soil are reported. It was found that the herbicides Propanid (propanil), 2M-4C (MCPA) and 2,4-D have low volatility but are rapidly photodegraded; the products of their degradation (chlorinated phenols and anilines) are highly volatile. Analysis of soil samples by thin layer chromatography showed that Propanid, 3,4-DCA, molinate and GMI had relatively low mobility in chernozem, gray forest, and meadow-chernozem soils.

80-1909. Baida, T. A. (Kazakh Inst. Plant Prot., Alma-Ata, USSR) **Ostatochnye kolichestva semerona v pochve i kapuste. [Residual amounts of Semeron in soil and cabbage.]** *Khim. Sel'sk. Khoz.* 17(12): 31-32; 1979 (2 references) (Russian).

Rates of degradation of the herbicide Semeron (desmetryne) are reported. Cabbage growing in the dark-chestnut soil was sprayed with Semeron (0.5 kg/ha) at the stage of 305 true leaves. Residues of Semeron in the soil and cabbage were determined 18 hr and 10, 20, 30, 45, and 60 days after treatment. Semeron was detected in cabbage for 70 days after treatment. On day 40 residues were 0.1 mg/kg. Within the first 10 days of treatment the amount of herbicide in cabbage was decreased by 40-50%. The maximum level of herbicide in a 0-20-cm soil layer was recorded within the first day of application; very small amounts of herbicide (0.01-0.05 mg/kg) could be detected in a 20-40-cm soil layer after 10 days.

80-1910. Kolesnikov, V. A.; Kazakova, M. G.; Karetskaia, N. A.; Luchaninov, A. V.; Petukhova, V. I.; Fokina, N. P. (Res. Inst. Veg. Grow., USSR) **Effektivnost' gerbitsidov na posevakh luka v razlichnykh pochvenno-klimaticheskikh usloviiakh. [Efficacy of herbicides in onion crop under different soil-climatic conditions.]** *Khim. Sel'sk. Khoz.* 18(2): 32-34; 1980 (Russian).

The efficacy of several herbicides used on onion crops, including Chlor-IFC (chlorpropham), Tenoran

(chloroxuron), Faloran, Mesoranil (aziprotryne), Izolin, Dacthal (DCPA), and Ramrod (propachlor), were studied under different climatic conditions and soil types. Residue studies of Dacthal and Ramrod were also performed on 2 types of loamy chernozem soil (Voronezh and Krasnodar) and in onion plants. Dacthal could not be detected in onion plants 55-88 days after soil application. Ramrod was completely degraded within 83-88 days of application. Dacthal applied at 12, 16 and 20 kg/ha to Voronezh soils ranged from non-detectable (ND) to 0.20 mg/kg at 83-88 days and was ND after 113 days. Dacthal in Krasnodar soil was still detected at 140 days. Ramrod was applied at 6.5, 9.0 and 11 kg/ha, and residues in both soil types were not detected after 113 days.

80-1911. Petrov, N. P. (Sci. Res. Inst. Veg. Growing, Moscow, USSR) **Primenenie prometrina, linurona i trikhloratsetata natriia na posevakh morkovi. [Use of prometryne, linuron, and sodium trichloracetate in carrot crop.]** *Khim. Sel'sk. Khoz.* 18(2): 35-38; 1980 (17 references) (Russian).

The results of the trials of herbicides prometryne, linuron, and sodium salt of trichloracetate (TCA) in carrot are presented. Application of prometryne (1.5 kg/ha) in combination with linuron (1.25 kg/ha) provided good weed control. This combination had no negative effects on the thickness of the carrot stand; there was a 26-29% increase of the yield of carrot. Thin layer chromatographic analysis showed no residues of herbicides in carrot roots at the time of harvest.

80-1912. Anan'eva, N. D.; Galiulin, R. V. (Inst. Agrochem. & Soil Sci., Moscow, USSR) **Vliianie 3,4-DCA na soderzhanie saprofitnykh bakterii v seroi lesnoi pochve. [Effect of 3,4-DCA on the incidence of saprophytic bacteria in gray forest soil.]** *Khim. Sel'sk. Khoz.* 18(2): 56-57; 1980 (19 references) (Russian).

An attempt was made to evaluate the effect of a major metabolite of a series of phenylamide herbicides, 3,4-dichloraniline (3,4-DCA), on the incidence of saprophytic bacteria in soil. A sample of gray forest soil was treated with water-aqueous solution of 3,4-DCA (50 mg/kg): On day 10, 20, 30 and 40 after treatment, soil suspension was inoculated onto nutritional medium. A six-fold increase of the count of saprophytic bacteria was recorded in an upper, 0-1 cm soil layer on day 10 after the treatment. The increase of the count of saprophytic bacteria was more pronounced in the 6-12 cm soil layer.

80-1913. Vyberal'ski, Iu. (Inst. Chem. Storage, Agric. Acad., Sczecin, Poland) **O fotolize khlorfenvinfosa. [Photolysis of chlorfenvinphos.]** *Khim. Sel'sk. Khoz.* 18(2): 58-59; 1980 (Russian).

An attempt was made to evaluate the mechanism of photolysis of the insecticide chlorfenvinphos (O,O-diethyl-1-(2,4-dichlorophenyl)-2,2- chlorovinylphosphate). It was found that the rate of degradation of chlorfenvinphos after UV-irradiation did not depend upon the level of humus in the soil. UV-irradiation changed the ratio of *cis*- and *trans*-isomers, causing *trans* → *cis* isomerization. The decrease of the sum of isomers was indicative of degradation of chlorfenvinphos due to hydrolysis and further oxidation.

80-1914. Falandysz, J. (Marit. Inst. Gdansk, PL-80954 Gdansk, Poland) **Chlorinated hydrocarbons in gulls from the Baltic south coast.** *Mar. Pollut. Bull.* 11(3): 75-80; 1980 (21 references).

The determination of polychlorinated terphenyls (PCT), PCB, DDT and hexachlorobenzene (HCB) in tissues of gulls from the Baltic south coast is described. The species studied were little gull (*Larus minutus* Pall.), black-headed gull (*Larus ridibundus* L.), common gull (*Larus canus* L.), and herring gull (*Larus argentatus* Pont.). The gulls, all of which were found dead and without signs of tissue decay, were collected at the beaches of the Gdansk Bay in 1975-1976. Liver, pectoral muscle and adipose tissue were extracted with petroleum ether, cleaned up with concentrated sulfuric acid, and analyzed by gas liquid chromatography for chlorinated hydrocarbons. All samples analyzed were found to contain substantial quantities of HCB, DDT and PCB-substances, with the adult herring gulls being the most affected with chlorinated hydrocarbons. The livers of adult herring gulls contained (on a fresh wt basis) 0.36-2.2 ppm HCB, 50-320 ppm ΣDDT, and 140-530 ppm PCB. For the other gulls, the residue levels in the liver ranged from 0.005 to 0.17 ppm HCB, 0.15-8.3 ppm Σ-DDT, and 0.14-8.4 ppm PCB. PCT substances in measurable quantities were found in only 2 birds, both black-headed gulls. Organochlorine residue levels found in gulls by other workers in various locations worldwide are also given.

80-1915. Coosemans, J.; Van Assche, C. (Lab. Phytopathol. & Plant Prot., Kathol. Univ. Leuven, Heverlee, Belgium) **Influence of chloride and nitrate fertilization on bromide residue in lettuce after soil disinfestation with methyl bromide or Bromochlor.** *Meded. Fac. Landbouwwet. Rijksuniv. Gent* 43(2 Pt 2): 1243-1249; 1979 (7 references).

The possibility of using chloride and nitrate fertilization to reduce bromine residues in tomatoes and lettuce grown in soil treated with methyl bromide (MB) was studied. Soil was disinfected with MB (98%). Salt doses based on equivilant bromide doses were applied, and tomatoes were planted. KCl, KNO_3, NaCl, $NaNO_3$, K_2SO_4 and KH_2PO_4 were applied at 2.5 and 5 eq dose rate. Tomato leaves were analyzed for Br^- content; all salts

tested reduced Br^- content. The Br^- content in the control fruit was 26.2 ppm, and among treated plants the Br^- content of the fruit ranged from 10.7 ppm for $NaNO_3$ (5.0 eq) to 24.7 ppm for KH_2PO_4 (2.5 eq). A second experiment was carried out in a similar way, using lettuce. The reduction in Br^- concentration as a result of Cl^- treatment was much higher than that resulting from NO_3^- treatment; K_2SO_4 and KH_2PO_4 had no influence at all. It is pointed out that a very high Cl^- or NO_3^- fertilization rate generally resulted in a lower Br^- level, but also resulted in poor lettuce growth. When the soil was leached prior to fertilization the Br^- content was much lower than after a treatment without leaching.

80-1916. Hashimoto, Y.; Ishihara, K.; Soeda, Y. (Nisso Inst. Life Sci., Nippon Soda Co. Ltd., Oiso, Kanagawa 255, Japan) **Fate of alloxydim-sodium on or in soybean plants.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 299-304; 1979 (3 references).

The sodium salt of 2-(1-allyl-oxy-amino-butyl--idene)-5,5-dimethyl 4-methoxy carbonylcyclohexane-1,3-dione (alloxydim-sodium; ADS) radioactively labeled (^{14}C) in the carbon-7 position was applied at rates of 5 mg/10 ml aqueous solution to the leaves of trifoliate-stage soybean plants. Plants were harvested 0, 1, 2, 4, 7, 10, 14, 21, 28, 42, or 63 days after treatment and analyzed for ADS content. Total recovery of the radioactivity decreased rapidly to 50.7% of the initial concentrations within 14 days, then at slower rates to 35.7% after 63 days. Translocation of the compound from the leaves was negligible and only 3.8% of the applied radioactivity was observed in stems and newly formed leaves. Immature seeds contained only 0.21% of the applied labeled material. ADS was degraded mainly to a deallyloxylated compound (45.6% after 4 days) and to 2 minor oxazole metabolites.

80-1917. Okazaki, H. (Natl. Inst. Agric. Sci., Kita-ku, Tokyo 114, Japan) **Formation of methyl pentachlorophenyl sulfoxide and sulfone from pentachloronitrobenzene in soil and plants.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 355-360; 1979 (17 references).

Residues and degradation of PCNB (quintozene) in soil and plants were investigated. PCNB or PCTA (pentachlorothioanisole, the major metabolite of PCNB) were applied at 28.5 ppm to sterile and field soil samples and PCNB, at 80 kg/ha, was also applied to an experimental field plot. Corn plants were grown in 2 ppm PCNB solutions for 10 days at 25 ± 3°C. Two metabolites of PCNB were isolated and identified as PCTA-SO and PCTA-SO_2. In the laboratory soil tests, 12.3 ppm PCNB were found 1 mo after treatment. Little degradation occurred in the sterilized soil, indicating that microbial action plays an active role in PCNB degradation. In the field trial, 14.1 ppm PCNB were found in soil collected 9 mo after application. In shoots of corn plants grown in PCNB solutions, 0.001 ppm PCNB, 0.053 ppm PCTA, 0.20 PCA, and 0.007 ppm PCTA-SO were detected.

80-1918. Fujii, Y.; Asaka, S.; Misato, T. (Ageo Res. Lab., Agrochem. Div., Nippon Kayaku Co. Ltd., Ageo, Saitama 362, Japan) **Photodegradation of dipropyl 4-(methylthio)phenyl phosphate (propaphos, Kayaphos).** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 361-366; 1979 (19 references).

Propaphos was uniformly radiolabeled in the phenyl ring (5.99 mCi/mmol), spotted (20 μl, 8.88×10^5 dpm) on silica gel plates and exposed to sunlight for up to 72 hr. Glass petri dishes to which propaphos (21 μl) had been evenly applied were also exposed to sunlight for up to 50 hr. ^{14}C-Propaphos was also added to distilled water (2 ppm) in petri dishes and exposed to sunlight with or without a glass cover. Propaphos photodecomposed rapidly; in each case the half-life was less than 2 hr. Four major degradation products were identified: propaphos-SO, propaphos-SO_2, phenol-SO, and phenol-SO_2. A degradation pathway for the photodecomposition of propaphos is proposed.

80-1919. Hashimoto, Y.; Ishihara, K.; Soeda, Y. (Nisso, Inst. Life Sci., Nippon Soda Co. Ltd., Oiso, Kanagawa 255, Japan) **Nature of the residue in soybean plant after treatment of alloxydim-sodium.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 375-378; 1979 (5 references).

Alloxydim-sodium (ADS) is a herbicide used for weed control in soybean, sugar beet and other broadleaf crops. [7-^{14}C] and [1,5-^{14}C] ADS plus unlabeled ADS (17.3 mg, 5.8 mg and 9.2 mg, respectively) were applied to 3 first-trifoliate leaves at the second trifoliate stage of soybean growth. Group I plants were placed outdoors on sunny days (19 days) and indoors at other times (12 days and at night). Group II plants were kept in a greenhouse for 3 days, washed with artificial rain (at 2 rates), and then placed outdoors for the same period as Group I. Group III plants were kept in the greenhouse for 7 days and were then treated like those in Group II. Residues of ADS in Group I soybean plants at 9-10 wk ranged from 0.02 to 0.15 ppm and in the seeds from 0.030 to 0.044 ppm. ADS residues in group II plants at 9-10 wk ranged from 0.02 to 0.87 ppm and in the seeds from 0.024 to 0.050 ppm. Group III plants at 9-10 wk had residues of 0.02-0.26 ppm ADS and seed residues of 0.022-0.044 ppm ADS. In seeds harvested at 9 wk, 10% of the measured radioactivity was in the lipid fraction.

80-1920. Eto, M.; Chou, S. S.; Taniguchi, E. (Dep. Agric. Chem., Kyushu Univ., Fukoka 812, Japan) **Photolysis of diisopropyl 1,3-dithiolan-2-ylidenemalonate,**

isoprothiolane fungicide. *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 379-382; 1979 (6 references).

Isoprothiolane on silica gel plates and in aqueous solutions was UV irradiated. Five degradation products were observed after the silica gel plate was developed in a *n*-hexane: benzene: acetone (9:5:1, v/v/v) solvent system. The spots were visualized by 1% potassium permanganate spray. The degradation products were isolated and chemically identified by further thin layer chromatography and spectrometry techniques. The half-life of isoprothiolane on silica gel was 3 hr. After 14 hr, the total percent of each of the decomposition products had changed. Based on these reactions, a photolytic degradation pathway of isoprothiolane is proposed. Under UV irradiation in deionized water, the half-life of isoprothiolane was 73.6 hr. In paddy water the half-life was shortened to 6.3 hr.

80-1921. Ohkawa, H.; Kikuchi, R.; Miyamoto, J. (Res. Dep., Pestic. Div. Sumitomo Chemical Co. Ltd., Takatsukasa, Hyogo 663, Japan) **Bioaccumulation and biodegradation of the (*S*)-acid isomer of fenvalerate (Sumicidin) in an aquatic model ecosystem.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 11-22; 1980 (14 references).

Changes in concentration of *S*-fenvalerate and DDT with the passage of time were noted in water containing nominal initial concentrations of 0.8 ppb of either chemical in the presence of carp. DDT was more rapidly taken up into the carp then was *S*-fenvalerate. In an aquatic model ecosystem the parent compound as well as degradation products in soil were desorbed in part into water and then taken up into organisms either directly or through food chains. When fenvalerate directly entered the environment it was rapidly adsorbed onto soil particles, organic matter or plants present in the water due to its low water solubility. These factors cause a rapid decrease in the concentration of fenvalerate before it is taken up into living animals.

80-1922. Hata, Y.; Isozaki, Y. (Pestic. Res. Lab., Takeda Chem. Ind. Ltd., Yodogawa-ku, Osaka 532, Japan) **The influence of soil properties on the adsorption and the phytotoxicity of piperophos.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 23-27; 1980 (14 references).

Soil samples of varying types were taken from paddy fields and made into soil slurries. Piperophos solutions at concentrations of 2.5 and 4.8 μg/ml were then added to the soil slurries. The extent to which adsorption occurred depended on the adsorptive capacity of the soils, including the C.E.C., phosphate absorption coefficients and hydroscopic water content. The total carbon content, clay content and pH of the soil played little part in determining the extent of adsorption. It is suggested that soil properties be considered when applying herbicides containing piperophos.

80-1923. Kurozumi, A.; Kurokawa, T.; Yamaguchi, I.; Misato, T. (Ageo Res. Lab., Agrochem. Div., Nippon Kayaku Co. Ltd., Ageo, Saitama 363, Japan) **Metabolism of 3,3′-dimethyl-4-methoxybenzophenone (methoxyphenone, NK-049) in paddy soils and by soil microorganisms.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 37-43; 1980 (16 references).

Under static flooded conditions NK-049 was demethylated to NK-049-OH both in Konosu and Mito soils with a half-life of about 10 days. A gradual disappearance of NK-049-OH was noted with liberation of carbon dioxide, particularly in Konosu soil. Other metabolites identified include the reduced product of the compound at the carbonyl group and the oxidized products of 3- or 3′-methyl group. A possible metabolic pathway for NK-049 in paddy soils is suggested.

80-1924. Fujii, Y.; Asaka, S.; Misato, T. (Ageo Res. Lab., Agrochem. Div., Nippon Kayaku Co. Ltd., Ageo, Saitama 362, Japan) **Fate of propaphos (Kayaphos) in rice plants.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 55-62; 1980 (22 references).

Propaphos was rapidly absorbed when used in foliar application with about 50% of the radioactivity being taken up within 6 hr. Most of the radioactivity was translocated to the upper part of the leaf. When given as a root application, propaphos was rapidly absorbed and translocation was extremely rapid to the shoots and leaves. In rice plants propaphos was gradually metabolized to some water soluble materials. The thio-ether moiety of propaphos was converted rapidly to sulfoxide and then slowly to sulfone in rice plants. More than 82% of the applied chemical was recovered from the soil and rice plants. In the plants most of the activity was accumulated in shoots and leaves with negligible amounts in the hulls and hulled rice. Metabolic pathways for propaphos in the rice plant are proposed.

80-1925. Clark, R. A. (Farrarmere, Benoni 1500, South Africa) **DDT contamination of the Sacred Ibis.** *Ostrich* 50(3): 134-138; 1979 (27 references).

The levels of organochlorine insecticides in fat and brain tissues of the Sacred Ibis (*Threskiornis aethiopicus*) were determined. Birds were collected in various feeding areas in a sanctuary in Pretoria, South Africa, and the whole brain and as much perivisceral fat as was easily obtainable were removed. Insecticide analysis was by gas chromatography with an electron capture detector. No *p,p′*-DDD (*p,p′*-TDE), dieldrin, heptachlor or isomers of BHC or PCBs were recorded. Traces of *p,p′*-DDT were present in a few samples. *p,p′*-DDE was found to occur in all samples analyzed. Mean *p,p′*-DDE concentrations were 28.35 mg/kg wet fat and 0.22 mg/kg wet brain. There was a significant correlation between concentrations of DDE in fat and brain, but there was no significant correlation bet-

ween a decrease in body fat and an increase or decrease in the DDE level.

80-1926. Mansager, E. R.; Still, G. G.; Frear, D. S. (Metab. & Radiat. Res. Lab., Agric. Res., SEA, USDA, Fargo, ND 58105) **Fate of ^{14}C diflubenzuron on cotton and in soil.** *Pestic. Biochem. Physiol.* 12(2): 172-182; 1979 (15 references).

The foliage of cotton plants (*Gossypium hirsutum* L.) grown under greenhouse conditions were sprayed with oil emulsion or aqueous suspension of ^{14}C-diflubenzuron at 43 or 45 days after germination. Diflubenzuron concentrations used were 600 μg/2 ml for the aqueous suspension and 553 μg/ml for the oil emulsion. Other cotton plants were grown on vermiculite and then transplanted to ^{14}C-diflubenzuron-treated soil (1.6 mg/3 kg of soil) 41 days after germination. Representative samples from the cotton plants were freeze-dried, mixed thoroughly and analyzed for ^{14}C by combustion analysis. Biometer flask experiments were also performed on diflubenzuron-treated soil to assess $^{14}CO_2$ evolution. Twenty-eight days after spray treatment, less than 0.05% of the applied ^{14}C was found in the newly developed plant tissues. No significant absorption, translocation or metabolism of diflubenzuron was found. Degradation of diflubenzuron took place in the soil. Of the ^{14}C incorporated into the soil, 28% was recovered as $^{14}CO_2$. Residues of unreacted ^{14}C-diflubenzuron and ^{14}C-chlorophenylurea remained in the soil. Eighty-nine days after treatment, insoluble ^{14}C-residues represented 67.8% of ^{14}C in the soil. Cotton plants grown in ^{14}C-diflubenzuron-treated soil for 89 days absorbed only 3% of the ^{14}C applied to the soil. Some metabolites of diflubenzuron were isolated from foliar and root tissues of the cotton plants and were characterized.

80-1927. Wright, A. N.; Roberts, T. R.; Dutton, A. J.; Doig, M. V. (Shell Res. Ltd., Shell Biosci. Lab., Sittingbourne Res. Cent., Sittingbourne, Kent ME9 8AG, England) **The metabolism of cypermethrin in plants: the conjugation of the cyclopropyl moiety.** *Pestic. Biochem. Physiol.* 13(1): 71-80; 1980 (10 references).

Lettuce plants were grown under conditions normally found outdoors and treated twice with cypermethrin labeled with ^{14}C at the Cl-cyclopropyl atom. The chemical was applied at a rate of 0.3 kg/ha. Twenty-one days after the last application, the plants contained mainly unchanged cypermethrin and polar materials which were conjugates of trans-2(2′,2′-dichlorovinyl)-3,3-dimethylcyclopropane carboxylic acid These findings suggest that oxidation at the cyclopropyl moiety plays only a minor role in the metabolism of cypermethrin in lettuce plants.

80-1928. Clark, D. R., Jr.; LaVal, R. K.; Krynitsky, A. J. (Patuxent Wildl. Res. Cent., US Fish & Wildl. Serv., Laurel, MD 20811) **Dieldrin and heptachlor residues in dead gray bats, Franklin County, Missouri – 1976 versus 1977.** *Pestic. Monit. J.* 13(4): 137-140; 1980 (6 references).

Lethal dieldrin concentrations were found in the brains of dead gray bats (*Myotis grisescens*) collected during 1976 and 1977 beneath a maternity roost in a Missouri cave. In addition, residues of heptachlor epoxide, oxychlordane, *cis*chlordane, and *trans*-nonachlor increased significantly in both brains and carcasses of bats collected during 1977. These increases appear to reflect a switch by local farmers from aldrin, dieldrin's parent compound, to heptachlor for the control of cutworms. They also constitute an additional threat to this colony of this endangered bat species. (Author abstract by permission)

80-1929. Wang, T. C.; Johnson, R. S.; Bricker, J. L. (Harbor Branch Fnd. Inc., Fort Pierce, Fl 33450) **Residues of polychlorinated biphenyls and DDT in water and sediment of the Indian River lagoon, Florida – 1977-78.** *Pestic. Monit. J.* 13(4): 141-144; 1980 (12 references).

Water and sediment samples collected during 1977-78 from the Indian River lagoon between Vero Beach, Indian River County, and Fort Pierce, Saint Lucie County, Florida, were analyzed for PCBs and DDT. Sample locations were chosen on the basis of proximity to major tributaries, sewage outfalls, or municipal areas. Concentrations in water samples were below 0.01 ppb ΣDDT and 0.5 ppb PCBs. Small amounts of PCBs and DDT were found in most sediment samples, ranging from <1.0 ppb to 0.63 ppm Aroclor 1254 and from <0.1 ppb to 0.081 ppm ΣDDT. Samples from the Taylor Creek tributary and from the Fort Pierce power plant and municipal docking area contained higher PCB concentrations than did samples from other locations. DDT and PCB levels in most samples indicate little contamination by these compounds of the Indian River Waterway between Vero Beach and Fort Pierce. (Author abstract by permission)

80-1930. Kaiser, T. E.; Reichel, W. L.; Locke, L. N.; Cromartie, E.; Krynitsky, A. J.; Lamont, T. G.; Mulhern, B. M.; Prouty, R. M.; Stafford, C. J.; Swineford, D. M. (US Fish & Wildl. Serv., Natl. Wildl. Health Lab., Madison, WI 53706) **Organochlorine pesticide, PCB, and PBB residues and necropsy data for bald eagles from 29 states – 1975-77.** *Pestic. Monit. J.* 13(4): 145-149; 1980 (8 references).

During 1975-77, 168 bald eagles (*Haliaeetus leucocephalus*) found moribund or dead in 29 states were analyzed for organochlorine pesticides and polychlorinated biphenyls (PCBs); 32 specimens from 13 states were analyzed for polybrominated biphenyls (PBBs). PCBs were present in 166 bald eagle carcasses and DDE was found in 165. TDE and dieldrin were identified in 137 samples, *trans*-nonachlor in 118, and oxychlordane in 90. Brains of 5 eagles contained possible lethal levels of dieldrin, and 2

eagles possibly died of endrin poisoning. Nine eagle livers, analyzed because of suspected lead poisoning, contained high levels of lead. Twenty percent of the eagles died from shooting, the most common cause of death; this cause of death, however, has declined. (Author abstract by permission)

80-1931. Dudley, D. R.; Karr, J. R. (Div. Surveillance, Ohio Environ. Prot. Agency., Columbus, OH 43215) **Pesticides and PCB residues in the Black Creek watershed, Allen County, Indiana – 1977-78.** *Pestic. Monit. J.* 13(4): 155-157; 1980 (5 references).

The aquatic environment of a small agricultural drainage in northeastern Indiana was surveyed during 1977-78 for pesticide and PCB contamination. A total of 45 water, sediment, and fish samples from Black Creek watershed, Allen County, Indiana were analyzed for 7 pesticides and PCBs. Low levels of dieldrin (mean 0.023 μg/g) and DDE (mean 0.016 μg/g) were found in all fish samples, but were not detected in water or sediment samples. PCB concentrations in fish were five times greater (0.102 μg/g) than were organochlorine pesticide concentrations. Two of 7 water samples contained PCBs at 0.4 μg/l and 0.2 μg/l. Only the herbicide 2,4,5-T occurred in surface water samples during low stream discharge, at concentrations of 0.2-7.7 μg/l. Atrazine, alachlor, carbofuran, and malathion were not detected in any samples. (Author abstract by permission)

80-1932. Lukowski, A. B. (Dep. Ecol. & Zool., Zool. Inst., Warsaw Univ., P-009271 Warsaw, Poland) **DDT and its metabolites in Antarctic birds.** *Pol. Arch. Hydrobiol.* 25(3): 729-737; 1978 (13 references).

Thirty-three birds representing nine species were shot and killed on an expedition to the Antarctic Peninsula and South Georgia Islands. Whole pectoral muscles from small birds, ~ 100 g muscle from large birds, livers, and subdermal fat if present, were analyzed by gas chromatography for DDT, DDE, DDD (TDE) and ΣDDT residues. The ΣDDT values in liver ranged from 0.0191 ppm in *Phalacrocorax atriceps* to 1.5730 ppm in *Catharacta skua.* The ΣDDT values in muscle ranged from 0.0161 ppm in *Sterna vittata* to 0.7135 ppm in *C. skua.* The ΣDDT levels in adipose tissue ranged from 0.0929 ppm in *Larus dominicanus* to 6.5916 ppm in *C. skua.* It is postulated that the diet of the birds is the major factor for the differences in the DDT residue levels observed.

80-1933. Patrick, G. B. (4241 W. 20th St. Apt 204-H, Cleveland, OH 44109) **Marijuana and the lung.** *Postgrad. Med.* 67(5): 110-118; 1980 (21 references).

A literature review of the effects of marijuana on the lungs is presented. A potential hazard exists due to the fact that the Mexican government sprays marijuana with paraquat. Evidence from confiscated marijuana bricks is given. Of 54 samples confiscated in 1976, 4 (7.4%) were positive for paraquat (1 ppm or more). Of the 46 samples collected in 1977, 9 (19.6%) were positive. Despite this, no paraquat-induced lung damage has been reported in human lungs. It is suggested that inhaled paraquat may have very different effects than paraquat ingested or experimentally implanted into the bronchial tree. Also, when contaminated marijuana burns almost 96% of the paraquat is converted to bipyridine, a chemical considered to be harmless. It is concluded that there appears to be no evidence that smoking contaminated marijuana is a hazard to the lungs.

80-1934. Rup Lal; Saxena, D. M. (Dep. Zool., Univ. Delhi, Delhi 119997, India) **Cytological and biochemical effects of pesticides on microorganisms.** *Residue Rev.* 73: 49-86; 1980 (165 references).

The cytological and biochemical effects of pesticides on microorganisms have been reviewed. The most obvious effect of herbicides is the inhibition of photosynthesis either due to their effect on the morphology of chloroplasts or due to their interference with the electron transfer system. Fungicides attack one or more sites to cause disorder and death of the organisms. They may act directly on cell wall, plasma membrane, mitochondria, or nucleus and thus inhibit the synthesis of nucleic acids. The latter may be brought about by interference with enzymes, as fungicides are known to react indiscriminately with these components of the cell. Chronic exposure to organochlorine compounds has been reported to inhibit enzyme activity and photosynthesis and to alter cell membrane permeability and integrity. They also interfere with the synthesis of DNA, RNA, and protein. It has been further suggested that insecticides, particularly the organochlorine compounds, interfere with the plasma membrane which in turn results in the inhibition of several other metabolic processes including those involved in the synthesis of DNA, RNA, and protein. Results of such experiments indicate the urgency for more detailed research in this direction in order to understand the mode of action of these compounds. At present, there is virtually no information which could indicate definitely whether the various effects of pesticides on microorganisms result from the action of an unmetabolized agent or from the direct effect of the metabolized compounds. (Author abstract by permission, abridged)

80-1935. Ciupe, R.; Gabor, S.; Fabian, F.; Olteanu, L. (Inst. Hyg. & Public Health, Cluj, Romania) **Contributi la evaluarea expunerii profesionale la DDT si HCH. [Contribution to the evaluation of professional exposure to DDT and HCH.]** *Rev. Ig. Bacteriol. Virusol. Parazitol. Epidemiol. Pneumoftiziol. Ig.* 28(4): 357-362; 1979 (20 references) (Rumanian).

DDT and HCH (BHC) residue levels were determined in 182 occupationally exposed farm workers, 27 occupationally exposed chemical workers, and in organs of 96 corpses. The levels found in the blood of the farm workers were 0.78 ppm for α-BHC, 5.65 ppm for γ-BHC (lindane) and β-BHC, 10.22 ppm for DDE, 0 ppm for DDA, and 3.02 ppm for *p,p'*-DDT. In the industrial workers, exposed to these substances during production processes, the blood levels were 16.2 ppm for α-BHC, 62.61 ppm for γ-BHC and β-BHC, 20.28 ppm for DDE, 0 ppm for DDA, and 10.63 for *p,p'*-DDT. The levels in the urine were 0.26 ppm for α-BHC, 0.90 ppm for γ- and β-BHC, 0.26 ppm for DDE, 0.58 ppm for DDA, and 0.26 ppm for *p,p'*-DDT in the farm workers, and 8.68 ppm for α-BHC, 22.15 ppm for γ- and β-BHC, 6.60 ppm for DDE, 8.33 ppm for DDA, and 3.27 ppm for *p,p'*-DDT. The BHC, DDE, and DDT levels measured in the organs increased with the age of the subjects.

80-1936. Lupea, L.; Gheorghievici, I. (Cent. Hyg. & Public Health, Timisoara, Romania) **Investigatii in stabilirea remanentei unor pesticide carbamice pe alimente. [Investigations aimed at establishing residue levels of some carbamic pest-controlling agents on foodstuffs.]** *Rev. Ig. Bacteriol. Virusol. Parazitol. Epidemiol. Pneumoftiziol. Ig.* 28(4): 371-378; 1979 (11 references) (Rumanian).

Residue levels of the pesticides dithane (maneb), lirocarmazine (a manganese and zinc dithiocarbamate mixture), morestan (quinomethionate), zineb, mancozeb, benlett (benomyl), derosol (carbendazim), decis (decamethrin), Actelic (pirimiphos-methyl), micodifol, and Turken (all designated as carbamate pesticides) were determined in tomatoes, cucumbers, cabbage, pumpkin, onions, and green peppers. The residue levels ranged from 0 to 2.67 mg/kg. The absolute highest value recorded was 241 mg/kg of dithane in tomatoes. In another experiment, cucumber, tomato and green pepper plants were treated with carbamate pesticides 10-15 days before harvesting according to package directions. The residue levels at harvest were 0.15 mg/kg in one case and 0 in all others. Serum cholinesterase (ChE) activities were also examined in farm workers exposed to the carbamates: 243 were tested in 1977 and 259 in 1978. The results indicated elevated ChE in 59 of the 243 and in 86 of the 259. No acute pesticide toxicity was noted in any of the workers. Headache, fatigue and sneezing were the most serious symptoms observed.

80-1937. Zamfir, G. (Inst. Hyg. & Public Health, Iasi, Romania) **Episodes acute de poluare a apei. Influenta lor asupra organismelor acvatice si omului. [Acute episodes of water pollution and their influence on aquatic organisms and on man.]** *Rev. Ig. Bacteriol. Virusol. Parazitol. Epidemiol. Pneumoftiziol. Ig.* 28(8): 269-273; 1979 (11 references) (Rumanian).

Episodes of acute poisoning due to water pollution with chemical substances, and the accumulation of pesticides in trophic chains are reviewed. When concentrations were 0.0001 mg/l in water, DDT levels were 0.01 mg/kg in plankton, 1 mg/kg in fish, and 25,000 mg/kg in ichthyiophagous birds. DDT levels found in human fat averaged 2.3 mg/kg. At dieldrin levels below the limit of detectability in salt-water, levels of 0.001 ppm in phytoplankton, 0.02 ppm in zooplankton, 0.2 ppm in fish, and 1.2 mg in ichthyophagous birds were found. Mercury levels of 0.1 ppm were found in Minamata Bay waters, while mercury levels in fish from Minamata Bay averaged 50 ppm.

80-1938. Brown, K. A. (Cent. Electr. Res. Lab., Leatherhead, Surrey KT22 7SE, England) **Phosphotriesterases of *Flavobacterium* sp.** *Soil Biol. Biochem.* 12(2): 105-112; 1980 (19 references).

Studies on a *Flavobacterium* enzyme having phosphotriesterase activity, important in the degradation of pesticides in soil, are presented. Stock cultures of *Flavobacterium* were sonicated then filtered to produce cell-free extracts. Gel filtration and preparative gel isotachophoresis were used to isolate the enzyme. 4-Nitrophenyl phosphotriesters were used as substrate to determine enzyme activity. Several factors, including nonspecific inhibitors and inhibition by substrate analogues, were studied. Non-ionic detergents inhibited activity as did mercurial thiol reagents and cysteine. Parathion, paraoxon, diazinon and their analogues were degraded by the enzyme, but substrates having weakly electrophilic 4-aminophenyl groups were either not hydrolyzed at all or actually inhibited enzyme activity.

80-1939. Mansell, R. S.; Wheeler, W. B.; Calvert, D. V.; Stewart, E. H. (Dep. Soil Sci., IFAS, Gainesville, FL) **Terbacil movement in drainage waters from a citrus grove in a Florida flatwood soil.** *Soil Crop Sci. Soc. Fl. Proc.* 37: 176-179; 1978 (8 references).

The appearance of the herbicide terbacil in drainage water after its application to a citrus grove for weed control was monitored. Terbacil was applied at a rate of 4.5 kg/ha, with irrigation beginning 1-2 hr later and continuing until a total of 16 cm of water had been applied. An additional 2.4 cm of rain fell during the sampling period. Water samples were collected immediately after flow started in the drain lines and every 2 hr thereafter for 48 hr; then 1 sample/day for 7 days; and finally one sample 4 days later. Terbacil in the water samples was quantified by electron capture gas chromatography, (average recoveries of 80-90% from fortified samples). Three different soil tillage treatments, surface tillage (ST), deep tillage (DT) and deep tillage + heavy lime (DTL) were considered. Two drain treatments, open outlet (water can empty completely and air can enter freely) and submerged outlet (remains completely filled with water when flowing and reduces air

concentration in drain), were studied. Water flow and total water discharge were always highest for the ST treatment. Maximum discharge rates ranged from 2000 mg/ha/hr in the ST plots to 250 mg/ha/hr in the DT plot. With the possible exception of the DTL plot, drain treatments had no influence on terbacil discharge. With open drain, the total terbacil discharged over the 13-day collection period was 82.7, 26.7 and 37.1 g/ha for ST, DT, and DTL treatments, respectively. The respective values for submerged drain were 80.9, 24.2, and 20.8 g/ha. It is pointed out that even with the relatively high ST data, only 1-2% of the applied terbacil was collected in drainage water during the 13 day period.

80-1940. Wheeler, W. B.; Mansell, R. S.; Calvert, D. V.; Stewart, E. H. (Dep. Food Sci. & Human Nutr., IFAS, Gainesville, FL) **Movement of 2,4-D in drainage waters from a citrus grove in a Florida flatwood soil.** *Soil Crop Sci. Soc. Fl. Proc.* 37: 180-182; 1978 (4 references).

The appearance of the herbicide 2,4-D in drainage water after its application to a citrus grove for weed control was monitored. 2,4-D was applied at a rate of 3.7 kg/ha, with irrigation beginning 1-2 hr later and continuing until a total of 16 cm of water had been applied. An additional 2.4 cm of rain fell during the sampling period. Water samples were collected immediately after flow started in the drain lines and every 2 hr thereafter for 48 hr; then one sample/day for 7 days; and finally one sample 4 days later. 2,4-D in the water samples was quantified by electron capture gas chromatography, (average recovery of 85% from fortified samples). Three different soil tillage treatments, surface tillage (ST), deep tillage (DT), and deep tillage + heavy lime (DTL) were considered. Two drain treatments, open outlet (water can empty completely and air can enter freely) and submerged outlet (remains completely filled with water when flowing and reduces air concentration in drain), were studied. Water flow and total water discharge were always the highest for the ST treatment. Maximum discharge rates ranged from approximately zero in the DT open-outlet drain to 5000 mg/ha/hr in the DTL open-outlet drain. Both drain outlet types and soil tillage treatments affected 2,4-D levels in drainage water. With open drain, the total 2,4-D discharged over the 13-day collection period was 15.3, 0, and 20.6 g/ha for ST, DT and DTL treatments, respectively. The respective values for submerged drains were 7.7, 3.9 and 8.8 g/ha. It is concluded that 2,4-D applied in this manner does not represent a significant environmental hazard, since the total quantity of 2,4-D discharged ranged from 0 to 0.5% of that applied.

80-1941. Pokorny, F. A.; Mills, H. A.; Hale, D. (Dep. Hortic., Coll. Agric. Exp. Stn., Univ. Georgia, Athens, GA 30602) **Retention of N in an inorganic and/or organic medium as influenced by nitrapyrin.** *Soil Crop Sci. Soc. Fl. Proc.* 37: 192-195; 1978 (11 references).

Studies were performed to determine if an organic or inorganic medium is more efficient in N-retention when exposed to nitrapyrin. Two experiments were performed. In the first, differing ratios of pine bark and sand media were treated with weekly applications of N as $(NH_4)SO_4$ or KNO_3. Nitrapyrin was applied at 50 ppm with 3 replications. The second experiment was conducted in 100% pine bark with nitrapyrin applied at 1, 50, 100, 150 and 200 ppm. Nitrogen was applied weekly as $(NH_4)SO_4$ or NKO_3. Tomatoes were grown in all the media. Media containing high concentrations of pine bark exhibited high nitrogen retention. Nitrogen loss was greater when applied as NO_3 as opposed to NH_4. NO_3 retention in 100% pine bark was improved by an increased nitrapyrin application rate. Medium NO_3 levels did not increase at nitrapyrin levels over 50 ppm when the nitrogen source was 100% NH_4. Tomato dry wt was unaffected by nitrapyrin when nitrogen was applied as NO^{-3}; however, NH_4 reacted with the nitrapyrin and reduced dry wt.

80-1942. Carazo, E.; Lord, K. A.; Ruegg, E. F. (Univ. Costa Rica, San Jose, Costa Rica) **The sorption of carbaryl on soils determined by spectrophotometric and radiometric techniques.** *Turrialba* 29(3): 159-162; 1979 (6 references).

Aqueous samples of ^{14}C-carbaryl (10 ml, specific activity 590 dpm/ml) was added to 1 g samples of sandy loam and clay soils 24 hr prior to radiometric assays of soil supernatants by spectrophotometry or by radiometric assay. A Perkin Elmer Coleman 46 UV-visible spectrophotometer and a Nuclear Chicagor Liquid Scintillation Spectrometer were used for the two methods, respectively. The loam soil samples absorbed carbaryl and *n*-naphthol much more strongly than did the clay soils with lower organic matter content. The results obtained by the two detection methods were generally in good agreement.

80-1943. Gile, J. D.; Collins, J. C.; Gillett, J. W. (Corvallis Environ. Res. Lab., Corvallis, OR) **The soil core microcosm. A potential screening tool.** *US NTIS PB Rep.* PB-103,534: 50 pp.; 1979 (27 references).

The report presents the results of 2 experiments performed at CERL in an effort to determine the suitability of a soil corn microcosm as a screening tool under FIFRA. The soil core microcosm consisted of a 5 × 10 cm soil core removed intact from a yield site and encased in PVC. In experiment I, 0.25 lb/acre (0.2825 kg/ha) applications of ^{14}C labeled dieldrin, methyl parathion and 2,4,5-T were examined, whereas 0.25, 0.50 (0.565 kg/ha) and 1.0 lb/acre (1.13 kg/ha) applications of HCB (hexachlorobenzene) were studied in experiment II. Weekly leachates were analyzed for NO_3, PO_4, NH_3, Ca^{2+}, and DOC as well as ^{14}C. The majority of the chemicals from both experiments found in the soil were in the top 2 cm. Extractable metabolites were detected for all but HCB. 2,4,5-T had practically no effect on any nutrient losses. NO_3 loss was

impacted by dieldrin and methyl parathion. PO_4 was impacted by methyl parathion, 0.5 lb/acre HCB and 1.0 lb/acre HCB. NH_3 was impacted by the two upper levels of HCB. Ca export was altered by methyl parathion and dieldrin. DOC was significantly impacted by methyl parathion and 1.0 lb/acre HCB. Treatment levels for all chemicals were below normal application rates and did not really challenge the system. It is possible to gain some assessment of chemical effect on a soil ecosystem, its fate and metabolism with the soil core microcosms. (Author abstract by permission)

80-1944. Stander, G. J. (Water Res. Comm., Pretoria, South Africa 0001) **Micro-organic compounds in the water environment and their impact on the quality of potable water supplies.** *Water S. Afr.* 6(1): 1-14; 1980 (25 references).

The available literature on micro-organics in water is reviewed with emphasis on establishing a positive course of action to be followed in South Africa in order to protect the limited water resources present there. Specific micro-organic compounds (including insecticides and herbicides) present in water are described with information concerning the influence of these compounds on the health of the general population of the area. Also considered are the odor and taste problems in drinking water and the capability of currently used methods to reduce the levels of these micropollutants to safe limits.

80-1945. Rice, R. P., Jr.; Putnam, A. R. (Dep. Ornament. Hortic., California Polytech. State Univ., San Luis Obispo, CA 93407) **Temperature influences on uptake, translocation, and metabolism of alachlor in snap beans (*Phaseolus vulgaris*).** *Weed Sci.* 28(2): 131-134; 1980 (13 references).

The uptake, translocation, and metabolism of ^{14}C-alachlor[2-chloro-2′,6′-diethyl-*N*-(methoxymethyl) acetanilide] by germinating and emerged snap bean (*Phaseolus vulgaris* L.) seedlings were monitored under 16 hr daylength (21 klux) comparing 16°C night/21°C day and 27°C night/32°C day temperature regimes. Total uptake of ^{14}C-alachlor by germinating snap beans was greater under the higher temperature. However, the compound was localized primarily in the roots where it was rapidly metabolized. At the lower temperature, the label was located in approximately equal amounts in all plants parts except cotyledons, and significantly less of the alachlor was metabolized. Root uptake of ^{14}C-alachlor and translocation of labeled compounds to the shoots were significantly greater under the higher temperatures. Approximately 60% of ^{14}C-alachlor was shown to volatilize from a watchglass after 48 hr at 27°C. After volatilization, uptake of ^{14}C-alachlor occurred in adjacent snap bean plants in a closed system. (Author abstract by permission)

80-1946. Hollingsworth, E. B. (South. Weed Sci. Lab., Agric. Res., SEA, USDA, Stoneville, MS 38776) **Volatility of trifluralin from field soil.** *Weed Sci.* 28(2): 224-228; 1980 (10 references).

Two methods of obtaining air samples were used over 4 mo periods in 1976 and 1977 to quantitate trifluralin (α,α,α-trifluoro-2,6- dinitro-*N,N*-dipropyl *p*-toluidine) vapors arising from a silt loam. With the first method, only the air from an enclosure covering 0.37 m^2 of soil was sampled. The second method used air probes to sample the air above the field. Rainfall and resultant soil moisture were related to trifluralin vaporization from field soil. Soon after trifluralin incorporation (0.84 kg/ha) and, while the soil was relatively dry, there was very little herbicide vaporization. Trifluralin vapors accumulated rapidly during a period in which several centimeters of rain fell, but with continued precipitation the vapor density declined. The influence of rainfall and resultant soil moisture upon vaporization became less apparent as the soil concentration of the herbicides declined. Less than 0.5% of the applied trifluralin was detected as vapors during each 4 mo period. (Author abstract by permission)

See also 80-1801, 80-1803, 80-1811, 80-1815, 80-1845, 80-1854, 80-1858, 80-1861, 80-1862, 80-1958, 80-1966, 80-1974, 80-2002, 80-2007, 80-2068 *and* 80-2083.

80-1947. Newton, M. (Author address not given) **Commentary on emergency suspension of 2,4,5-T and silvex by the U.S. Environmental Protection Agency.** *Agric. Environ.* 4(4): 307-309; 1979.

The suspension by the EPA of the use of 2,4,5-T and silvex for forestry, right-of-way, and pasture applications is discussed. The evidence presented by the EPA is reviewed briefly, and is concluded to be unscientific and prejudicial in nature. Concern is expressed for the development of pest management technology in a climate where such nonscientific regulatory action is permitted.

80-1948. Nigg, H. N. (Inst. Food & Agric. Sci., Agric. Res. & Educ. Cent., Univ. Florida, Lake Alfred, FL 33850) **Prediction of agricultural worker safety reentry times for organophosphate insecticides.** *Am. Ind. Hyg. Assoc. J.* 41(5): 340-345; 1980 (39 references).

Concepts and current methods of determining worker safety reentry times are reviewed. Comparison of human monitoring studies, factors in a worker reentry episode and exposure estimation methods illustrate the advantages of estimation methods. Research needs for worker reentry times are discussed. A systematic view of the worker reentry situation is suggested. (Author abstract by permission)

80-1949. Jackson, R. S. (Dep. Health, Richmond, VA 23219) **Early testing and subsequent evaluation of the insecticide Kepone.** *Ann. NY Acad. Sci.* 329: 318-320; 1980.

Various factors which combined to effectively conceal possible concerns over the safety of Kepone (chlordecone) in the early 1960's are reviewed. It is noted that while various reports and data were available which indicated that Kepone was possibly a carcinogen, these facts and concerns were never linked together until after workers at the Hopewell plant were found to be ill from exposure to this chemical. It is noted that there did not exist any one location where all the information available on the chemical could be found. A major effort has been launched in Virginia to require the reporting of occupational illnesses in the same manner as venereal and other communicable diseases.

80-1950. Morgan, D. P.; Lin, L. I.; Saikaly, H. H. (Dep. Prev. Med. & Environ. Health, Coll. Med., Univ. Iowa, Iowa City, IA 52242) **Morbidity and mortality in workers occupationally exposed to pesticides.** *Arch. Environ. Contam. Toxicol.* 9(3): 349-382; 1980 (12 references).

Utilizing cause-of-death information and responses to questionnaires addressed to survivors, mortalities and health impairments in a cohort of workers occupationally exposed to pesticides were compared to occurrences in workers not pesticide exposed, over the period 1971-1977. Seventy two percent of 2620 pesticide-exposed workers, and 75% of 1049 controls, recruited in 1971-1973, were accounted for either by returned questionnaire or mortality. Disease incidence rates were studied in relation to broadly defined occupational subclasses, and to serum concentrations of organochlorine pesticides (OCl) measured at the time of recruitment. Death by accidental trauma was unusually frequent among pesticide applicators. Mortalities from cancer and arteriosclerosis were not detectably different from those observed in the controls. Among survivors, dermatitis and skin cancer were unusually common in structural pest-control operators. Internal cancer was no more frequent in the intensively pesticide-exposed workers than in the controls, but it appeared to occur at an unusually high rate in workers characterized as possibly pesticide-exposed. There were apparent associations between high serum pesticide OCl levels measured in 1971-73 and the subsequent appearance of hypertension, arteriosclerotic cardiovascular disease, and possibly diabetes. This could imply a causal role of any of the pesticidal and other environmental stresses to which these workers were exposed. The limitations of this type of followup study is discussed. (Author abstract by permission)

80-1951. Anonymous **Simmering 2,4,5-T dispute boiling over.** *Chem. Week* 126(15): 32-33; 1980.

Current cancellation hearings on the registration of the herbicides 2,4,5-T and silvex by the US EPA are discussed. It is predicted that the Agency will attempt to ban the domestic uses of the herbicides 2,4,5-T and silvex. Dow Chemical Co., the principal manufacturer of both pesticides, responded to the EPA's suspension of the chemicals by challenging most of the data to be presented at the hearings. The alleged health problems with 2,4,5-T, silvex, and the herbicide Agent Orange (a mixture of 2,4,5-T and 2,4-D) are linked to the contaminant 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) formed during production of the herbicides. In the cancellation hearings the EPA is expected to produce about 60 witnesses to show that TCDD causes adverse effects, including cancerous tumors and spontaneous abortions, in several animal models. Dow is seeking to discredit these findings by arguing that the levels of TCDD in 2,4,5-T are only about 0.1 ppm, and that the half life of dioxin in sunlight is only about 6 hr, while that of 2,4,5-T in the environment is about 2 mo. Dow also challenges, on statistical grounds, the EPA Alsea, Oregon, study linking 2,4,5-T spraying programs with abortions by women living near the sprayed areas.

80-1952. Anonymous **Residus de pesticides dans l'alimentation. [Pesticide residues in food.]** *Chim. Actual.* (1658): 5; 1980 (French).

Maximum allowable pesticide residues in and on food intended for human consumption are reported. The new limits will be effective as of July 1, 1981. The limits set for meat and meat products (on fat basis) are 0.2 mg/kg for aldrin and dieldrin, 0.005 mg/kg for chlordane, 1 mg/kg for ΣDDT, 0.02 mg/kg for endrin and heptachlor, 0.1 mg/kg for hexachlorobenzene and β-BHC, 0.05 mg/kg for α-BHC, and 0.7 mg/kg for lindane. For milk and milk products, the limits are 0.15 mg/kg for aldrin, dieldrin, and heptachlor, 0.02 mg/kg for endrin, α-BHC and β-BHC, 1 mg/kg for ΣDDT, and 0.1 mg/kg for hexachlorobenzene.

80-1953. WHO, Geneva, Switzerland **Third World needs improved control of pesticides.** *Environ. Conserv.* 6(3): 180; 1979.

Some of the decisions reached by the WHO Expert Committee on the Safe Use of Pesticides are discussed. Much of this discussion centered around the needs of the Third World for ensuring the safe use of pesticides. The establishment of national control agencies, to register pesticides, evaluate needs, and control pesticide introduction, was set as a major priority for developing countries. The Committee agreed that the increasing use of pesticides is necessary to meet public health requirements in the control of disease and to increase food production. However, there are environmental and other problems, and the benefit-risk evaluation will differ in each case. It is suggested that in the future an increasing number of Third World countries will be preparing their own formulations and manufacturing their own products and it will be the responsibility of national governments to ensure adequate control of quality and use, with the support of international agencies.

80-1954. Zolotnikova, G. P. (All-Union Sci. Res. Inst. Labor Prot. Agric., Orel, USSR) **O rannem vyyavlenii funktsional'nyakh narushenii pecheni u rabonits teplits kontaktiruyashchikh s pestitsidami. [Early detection of liver function impairment in hothouse workers exposed to pesticides.]** *Gig. Sanit.* 45(2): 24-27; 1980 (12 references) (Russian).

An attempt was made to identify the most sensitive and informative tests for evaluation of the functional state of the liver in hothouse workers exposed to pesticides. The female workers were occupationally exposed to organophosphorus pesticides [Rogor (dimethoate), carbophos (malathion), chlorophos (trichlorfon), DDVP (dichlorvos), Antio (formothion), and metaphos (methyl parathion)], organochlorine pesticides [Kelthane (dicofol), Nemagon (DBCP), and D-D], carbamate derivatives [Fundazol, zineb, and Morestan (quinomethionate)], and nitro derivatives [Acrex (dinobuton) and Karathane (dinocap)]. Concentrations of pesticides in the greenhouse air were 7-10 times greater than the maximum permissible concentrations. A total of 90 female workers were examined; incidence of diseases of the liver and biliary ducts in the workers who were exposed to pesticides for > 5 yr was significantly lower than in the workers with 1 yr exposure (6.6% and 2.6%, respectively). It was found that majority of the workers had normal parameters of protein-synthesizing liver function, and normal activity of aldolase, alkaline phosphatase, transaminases, and amylase. Significant increase of the activity of histidase was recorded in 69% of the workers, while 58% featured significant inhibition of activity of cholinesterase.

80-1955. Zolotnikova, G. P. (Inst. Vocational Prot. Agric., Orel, USSR) **O narushenii immunologicheskoi reaktivnosti organizma pod vozdeistviem pestitsidov v usloviiakh teplits. [Disturbances of immune reactivity after exposure to pesticides under hothouse conditions.]** *Gig. Tr. Prof. Zabol.* (3): 38-40; 1980 (Russian).

The state of immunological reactivity in 70 female hothouse workers with prolonged exposure to pesticides was evaluated. Analysis of indices of nonspecific immunity showed increased microbial dissemination of the skin. The degree of dissemination was correlated with duration of exposure to pesticides. Workers with > 2 yr exposure had significantly decreased phagocytic activity of neutrophils. Specific increase of the blast transformation of peripheral blood lymphocytes in response to Rogor (dimethoate), Acrex (dinobuton), carbophos (malathion), zineb, and Kelthane (dicofol) was detected in 47-52% of the workers with > 5-yr exposure. General morbidity increased with the increase of the duration of exposure to pesticides: allergic skin diseases were more frequent among workers with 1-5-yr exposure, while bronchial asthma, liver and kidney diseases were more frequent among the workers with > 5-yr exposure.

80-1956. Anonymous **Physicians urged to report pesticide poisonings.** *J. Miss. State Med. Assoc.* 21(4): 87; 1980.

The Mississippi Epidemiologic Studies Program (ESP) has established a nationwide project to record human pesticide poisoning incidents. The Pesticide Incident Monitoring Program System (PIMS) also documents pesticidal exposure of animals and the environment. To elicit the cooperation of physicians in reporting poisoning incidents, ESP provides forms which request such information as the time, place, pesticide involved, occupational relationship, route of exposure, major symptoms exhibited and treatment given. Acute, subacute, and chronic exposures are all recorded in the PIMS. The Mississippi ESP operates the program under contract with the US EPA and is responsible for implementing the pesticide monitoring network in Mississippi, Alabama, Kentucky and Tennessee. PIMS also offers free cholinesterase determinations and pesticide residue analyses to physicians to aid in the

diagnosis and confirmation of poisoning cases. A complimentary copy of *Recognition and Management of Pesticide Poisonings* is provided to participating doctors. Addresses are included to obtain more information about the ESP or PIMS.

80-1957. Andreeva, E. I. (All-Union Res. Inst. Chem. Means Plant Prot., Leningrad, USSR) **Pentatiuram - protravitel' semian. [Pentathiuram - seed dressing.]** *Khim. Sel'sk. Khoz.* 17(12): 39-40; 1979 (Russian).

The spectrum of activity, efficacy, and maximum permissible concentrations (MPC) of the new seed dressing pentathiuram [30% tetramethylthiuramdisulfide (thiram) and 20% pentachloronitrobenzene (quintozene)] are reviewed. The fungicide can be used in combination with various pesticides, including γ-HCCH (γ-BHC; lindane) and heptachlor. The MPC in the air of the working zone is 0.5 mg/m³. It is suggested that grain treated with pentathiuram should not be used as a fodder.

80-1958. Wirthgen, B. (Hyg. Inst., Berlin, DDR) **Untersuchungen zum Einsatz von Dichlorvos in Muehlenbetrieben. [Studies on the use of dichlorvos in flour mills.]** *Nahrung* 23(4): 417-423; 1979 (4 references) (German).

The maximum safe concentration of dichlorvos (DDVP) for use in flour mills to control flour insect infestation was determined from DDVP decomposition curves in wheat flour. The degree of contamination was found to vary with surface quality, fat content and humidity of the milling product. A concentration of 0.6 ml/DDVP/m³ at 18-22°C was considered to be the safest effective level. Under these conditions DDVP residues decomposed within 2-4 wk. It was determined that food products should not be uncovered during the fumigation operations.

80-1959. Davies, J. E.; Enos, H. F. (Dep. Epidemiol. & Public Health, Sch. Med., Univ. Miami, Miami, FL) **Pesticide monitoring and its implications.** *Occup. Health Saf.* 49(3): 68C, 68D, 68E, 68H; 1980.

Aspects of pesticide monitoring, including the three major types of exposure (incidental, acute and chronic), are reviewed. The major medical problems associated with acute pesticide exposure are systemic poisoning and topical effects (dermatitis, eye injuries). It is pointed out that incidence data are difficult to obtain, and that laboratory verification of suspected exposure is an important component of monitoring because pesticide poisonings can mimic a variety of commonly occurring illnesses. A wide variety of pathologies have been linked with chronic pesticide exposure, including neurological, testicular and pulmonary diseases. NIOSH estimates that approximately 350,000 workers have been exposed to pesticides, and recommends a variety of industrial hygiene practices. Problems of monitoring pesticide exposure in agricultural workers are discussed. It is pointed out that in a review of cause-specified mortality rates, mortality rates from respiratory diseases in farm workers were triple the rate of their employers or managers. Often, the wives and children of agricultural workers are also exposed. Suggestions for new approaches for monitoring agricultural exposures are given.

80-1960. Horsfield, T. (Author address not given) **Pesticides - are they safe?** *Occup. Saf. Health.* 10(4): 30-31; 1980.

A brief discussion of the pesticide safety standards of the British Agrochemical Supply Industries Scheme (BASIS) and some safety tips to agrochemical users are presented. To ensure high safety standards chemical manufacturers have tightened distribution of pesticides and are promoting and monitoring the education and training of pesticide distributors and applicators. It is also noted that pesticide users are legally required to use only approved chemicals, train and supervise all staff, maintain all equipment and provide (and ensure the use of) adequate protective clothing and equipment of all staff. Additionally, measures to prevent risks to the safety and health of the public, as well as prevention of exposure of livestock and waterways, are to be taken.

80-1961. Shoup, S.; Whitcomb, C. E. (Author address not given) **Using activated carbon to inactivate herbicides in the landscape.** *Okla. Agric. Exp. Stn. Res. Rep.* (P791): 58-59; 1979.

Twenty pounds AI/acre (22.6 kg/ha) of Hyvar (bromacil, 80% AI) was applied to test plots. Grosafe activated carbon at 0, 1, 3 and 5 lbs/100 ft² (0, 4.84, 14.52 or 24.2 mg/cm²) was applied to the treated plots and either incorporated about 2 in (5.08 cm) deep or left on the soil surface. The soil used was a heavy clay loam. The 1 lb rate of activated carbon application, with or without incorporation, was of little use to any test plants. The higher rates of activated carbon application delayed the reaction of the plants to Hyvar. However, all plants in Hyvar-treated plots died by day 35. The use of activated carbon did not inactivate the herbicide. The use of Hyvar, or similar soil stimulant herbicides, should be discouraged in areas where desirable plants exist or where vegetable, turf or landscape plants may be planted in the future.

80-1962. Il'ina, B. I. (All-Union Res. Inst. Hyg. & Toxicol. Pestic. Polym. & Plastic., Kiev, USSR) **Vpliv kompleksu pestitsidiv na rozvitok ginekologichnikh zakhvoryuvan' u polevodiv. [Effect of pesticides on development of gynecological diseases in field-crop**

growers.] *Pediatr. Akush. Ginekol.* (1): 48-50; 1980 (4 references) (Ukrainian).

The effect of exposure to pesticides on gynecological morbidity was studied in a group of 653 female field-crop growers. The workers has been occupationally exposed to organochlorine and organophosphorus pesticides for 5 to 10 yr (6.2%) and > 10 yr (93.8%) duration. Reduced tolerance to pesticides (headache, nausea vomiting and, fatigue) was recorded in 151 workers. It was found that the workers had a significantly increased incidence of menstrual cycle dysfunction (12.2%, compared to 2.8% in control group); 7.1% had polyps in the cervix uteri, 7.5% had ovarian cysts, and 5.9% had uterine fibromyoma. Prolonged exposure to pesticides increased the incidence of primary and secondary infertility.

80-1963. VanMiddelem, C. H. (Div. Chem., Florida Dep. Agric. & Consumer Serv., Tallahassee, FL 32301) **Regulatory and research approach to current pesticide residue problems at the state level (Florida, USA).** *Residue Rev.* 73: 1-11; 1980 (9 references).

The Florida Department of Agricultural and Consumer Services, Division of Chemistry, Bureau of Chemical Residue Laboratory, is responsible for the regulation and enforcement of all pesticide residue tolerances on foods and commercial feeds produced or sold in Florida. This regulatory bureau is composed of 3 laboratories located in North, Central and South Florida and analyzes approximately 6000 samples annually. About 60% of this sampling total are fresh vegetables grown or shipped into Florida and 15 to 20% are commercial feed samples. The remaining 20 to 25% are dairy, red meat, poultry, and seafood products, as well as frozen and processed foods. Approximately 80% of all vegetables sampled are leafy types having the highest potential for excessive pesticide residues, whereas the remaining 20% are types that normally have a moderate potential for residue accumulation. The primary factors considered in developing the vegetable sampling program include crop residue potential, mammalian toxicity, persistency, and frequency of pesticide application to the crop. In Florida, the agency responsible for pesticide residue research is the Institute of Food and Agricultural Sciences, Pesticide Research Laboratory, located at the University of Florida. This laboratory has been assigned the responsibility of coordinating all the current IR-4 minor or specialty use requirements for the Southern Region. For a number of years this laboratory has recognized the need for more sensitive and practical methods to analyze for low levels of *N*-methylcarbamate and carbamyl oxime pesticides applied to various crops. A dynamic fluorogenic labeling detector was developed and characterized for HPLC analyses of a number of carbamates used commercially in Florida. For a number of years another general area of research interest at this laboratory involved investigations into the efficiency of various solvent extraction combinations for the quantitative removal of field-weathered residues using radiolabeled pesticides. (Author abstract by permission, abridged)

80-1964. Dunn, C. L. (Regulat. Affairs, Boots Hercules Agrochem. Co., Wilmington, DE 19899) **Contamination or pollution - the judgment aspect of residues.** *Residue Rev.* 73: 93-99; 1980.

Risk/benefit is being emphasized as a means of achieving difficult decisions concerning the regulation of chemicals and their uses. The regulation of pesticides has established certain practices and concepts which can be applied to other chemicals as well. Historically, a number of commissions have studied the need for pesticide chemicals and the problems generated by their use and regulation. Subsequent laws to ensure environmental protection or enhancement have been enacted to cover chemicals other than pesticides. A distinction between contamination and pollution is based on the concept that contaminants are anything added to the environment in excess of its occurrence in the absence of human activity, whereas pollutants are contaminants present at levels sufficient to harm something valued by man. Workable regulations require that such a distinction be made so that environmental and food crop monitoring data can be used in a sensible way. This is especially true when improved analytical methodology results in lower detection limits. The tactic of using exaggerated estimates of theorized exposure to compensate for an incomplete or inadequate data base has been used, but leads to unrealistic regulation. Simplistic regulation by way of forbidding the use of certain useful materials, especially carcinogens, is an inadequate approach. The determination of risk/benefit is fraught with problems of incommensurable components and the application of politically determined public policy to establish acceptable risk. Thus, the final regulatory action requires excellent scientific input to be used in this process, but is not in itself a totally scientific exercise. (Author abstract by permission, abridged)

80-1965. Muller, F. O.; Hundt, H. K. L. (Dep. Pharmacol., Univ. Orange Free State, Bloemfontein, South Africa) **Chronic organophosphate poisoning.** *S. Afr. Med. J.* 57(10): 344-345; 1980 (3 references).

Effects of chronic organophosphate poisoning on plasma cholinesterase and erythrocyte acetylcholinesterase activities are discussed. Evidence is presented which indicates that plasma cholinesterase activity appears to be very susceptible to inhibition by cholinesterase inhibitors, and that erythrocyte acetylcholinesterase correlates better with the degree of clinical involvement. Plasma cholinesterase and erythrocyte acetylcholinesterase were determined in 23 factory workers exposed dermally or by inhalation to organophosphate compounds. Only 2 had normal plasma cholinesterase, and 8 (35%) had normal erythrocyte acetylcholinesterase activity. Seventeen (74%)

had plasma cholinesterase activity below 50% of this laboratory's lower normal value. Only 5 (22%) had erythrocyte acetylcholinesterase activity below 50% of the laboratory's lower normal value. The only subject with significant symptoms of organophosphate poisoning exhibited erythrocyte acetylcholinesterase activity below 25% of the lower normal value. It is suggested that all workers chronically exposed to cholinesterase inhibitors have plasma cholinesterase and erythrocyte acetylcholinesterase activities determined at 3 mo intervals. However, it is pointed out that since plasma cholinesterase activity is dependent on various factors, it should serve only as an index of actual exposure, and not as a criterion of the severity of exposure.

80-1966. George D. Ward & Assoc., Portland, OR **Controlled soil microbial detoxification of 2,4-D herbicide manufacturing residue.** *US NTIS PB Rep.* PB-287,408: 99 pp.; 1978.

This study investigated the feasibility of achieving bacteriological detoxification of herbicide and pesticide manufacturing residues through the action of naturally occurring soil microorganisms under controlled soil conditions. Municipal sewage sludge was used as a nutrient source and stimulant for growth and basic support of the soil microorganisms capable of using herbicide and pesticide residues as a food source for carbon. The basic toxic waste material investigated was trichlorophenol (TCP), distilled from 2,4-D manufacturing residue (tars). Both aerobic and anaerobic soil test samples were incubated in a greenhouse with loadings of TCP at 100 ppm and 1000 ppm. Soil samples were taken once a week over a 2 mo period and then analyzed to determine the rate of TCP degradation. For the conditions examined, it was found that naturally occurring soil microorganisms do have the capability of bacteriological degradation of TCP in a microbial process that appears to be potentially continuous as well as safe. (Author abstract by permission)

80-1967. WHO Expert Comm. on Vector Biol. & Control, Geneva, Switzerland **Safe use of pesticides.** *WHO Tech. Rep. Ser.* 634: 44 pp.; 1979 (19 references).

Developments in toxicology studies of pesticides used for vector control and recommendations by the WHO committee on the safe use of pesticides in both public health and agriculture are presented. General information on the factors influencing pesticide toxicity, the effects of impurities in pesticides, as well as data on organophosphate, carbamate, pyrethroid, larvicide, rodenticide and biological control agents are given. Also reviewed are observations of people exposed to pesticides, precautionary measures and methods of monitoring exposure and other aspects of safe use of pesticides. Education and training on local, national and international levels is suggested to ensure safe use and several recommendations by the committee encourage development of education and training programs for agricultural workers and school children.

80-1968. Evseev, V. N. (Clin. Med. Vocat. Eval., Inst. Adv. Training Physicians, Novokuznetsk, USSR) **Nevrologicheskie narusheniia posle ostrykh otravlenii khlorofosom i trudovoi prognoz pri nikh. [Neurological disturbances and vocational prognosis after acute poisoning with chlorophos.]** *Zh. Nevropatol. Psikhiatr. im. S. S. Korsakova* 80(2): 203-208; 1980 (17 references) (Russian).

Between 1971 and 1977, acute chlorophos (trichlorfon) poisoning was diagnosed in 240 patients. Thirty of these patients died. Of the 210 surviving patients, 105 (27 men, 78 women, aged 16-60 yr) were examined within 1-7 yr of poisoning. Twenty-five patients recovered and resumed their vocational activity. In 80 patients, various neurological disturbances were observed. Neurovascular changes were observed in 13, 35 had both neurovascular and trophic changes, and 32 developed neuro-trophic disturbances and paralysis.

See also 80-1810, 80-1811, 80-1854, 80-1861, 80-1936, 80-1944, 80-1976 *and* 80-1996.

80-1969. Herichova, A. (Dep. Plant Physiol., Fac. Nat. Sci., Univ. Komensky, Bratislava, Czechoslovakia) **Study of the influence of ethylenethiourea on chromosome structure.** *Acta Fac. Rerum Nat. Univ. Comenianae Physiol. Plant.* 16: 19-22; 1979 (2 references).

Meristematic cells of the root tips of the horsebean (*Vicia faba*) were used in studies to determine the influence of ethylenethiourea (ETU) on cell division. ETU concentrations of 0.1, 1.0, and 10.0 mg/l distilled water were tested, and samples were taken after 1, 2, 4, 6 and 8 hr. The cells were fixed and examined cytologically. ETU was found to influence the process of chromosome differentiation. During prophase, an intensification of the spiralization process was seen, in which the chromosomes are prematurely shortened and thickened. In addition, formation of chromosomal bridges occurred during anaphase and telophase. In some cases, micronuclei were formed after ETU application. It is pointed out that the effects of ETU on chromosome structure are similar to those observed with other derivatives of carbamates.

80-1970. Timonen, T. T. T.; Palva, I. P.* (Hatanpaa Hosp., SF-33100 Tampere 10, Finland) **Acute leukaemia *(sic)* after exposure to a weed killer, 2-methyl-4-chlorphenoxyacetic acid.** *Acta Haematol.* 63(3): 170-171; 1980 (5 references).

A 64-yr-old farmer of North Finland was exposed to MCPA after the spray container which he carried on his back during application leaked on his clothing. He had previously been exposed to weed killers for 5 consecutive summers. Upon admission to the hospital, he was treated with prednisolone and methenolone. Five mo later his Hb was 13.5, his leukocytes were 7600 with 46% neutrophils and 190,000 platelets. The patient was not seen again until 12 mo later when a persistent cough and fever led him to see a doctor. The physician noted a mild anemia and a moderate leucocytosis with thrombocytopenia. He was referred to the University Hospital where a myelomonocytic acute leukemia was diagnosed. Prednisolone therapy was ineffective and the patient died 3 wk later of acute cerebral hemorrhage. The course of the leukemia was consistent with previously described cases of extensive exposure to benzene. It was suggested that this case and others describing exposure to agricultural chemicals be looked at as evidence that agents other than benzene may be responsible for the alarming increase in cases of myelogenous leukemia.

80-1971. Gupta, S. P.; Verma, S. R.; Dalela, R. C. (Unit Pollut. Relevant Res. Lab., Dep. Zool., D.A.V. Coll., Muzaffarnagar, India) **Studies on the toxicity of a few pesticides on *Colisa fasciatus* and *Notopterus notopterus* with reference to histopathology and histochemistry. Part I. Bioassay studies.** *Acta Hydrochim. Hydrobiol.* 7(2): 223-238; 1979 (39 references).

Colisa fasciatus and *Notopterus notopterus* specimens were exposed to aldrin at concentrations of 0.021-0.042 mg/l for *C. fasciatus* and 0.00056-0.00135 mg/l for *N. notopterus.* The parathion concentrations used were 1.8-3.7 mg/l for *C. fasciatus* and 0.49-1.00 mg/l for *N. notopterus.* Prior to death the fish demonstrated excitation, erratic swimming ability, difficulty in respiration, increased ventilation rates, loss of equilibrium, jerky movements, convulsions, loss of body skin color, and excess secretion of mucus. Variables such as temperature, amount of dissolved oxygen present, pH, and size of the fish affected the median lethal dose levels of each pesticide. Aldrin was more toxic than parathion. *Colisa fasciatus* was the more resistant species. Harmless concentrations for *C. fasciatus* ranged from 0.0049 to 0.0161 mg/l aldrin and from 0.54 to 0.99 mg/l for parathion. For *N. notopterus* the harmless concentrations were 0.00012-0.00045 mg/l aldrin and 0.10-0.21 mg/l parathion.

80-1972. Ladefoged, O. (Dep. Pharmacol. & Toxicol., Royal Vet. Agric. Univ., Copenhagen, Denmark) **The effect of carbon tetrachloride (CCl_4) induced liver damage on the volume of distribution, the elimination half-life and body clearance of antipyrine and warfarin in rabbits.** *Acta Vet. Scand.* 20(3): 429-437; 1979 (15 references).

Male rabbits were injected with carbon tetrachloride to induce liver damage. In those rabbits receiving injections of antipyrine prior to the carbon tetrachloride, the hepatotoxicity of carbon tetrachloride was significantly increased. When carbon tetrachloride was administered prior to antipyrine, the elimination of the latter compound was significantly reduced. When warfarin was injected before or after carbon tetrachloride intoxication, the volume of distribution and the elimination of warfarin was reduced at 24 hr. Neither of these findings were still present at 10 days after carbon tetrachloride injection. In the case of each of these chemicals, the body clearance was reduced to about one third of the control.

80-1973. Dirlbek, J.; Kara, V. (State Inst. Plant Prot., Prague, Czechoslovakia) **Vliv dlouhdobe aplikace herbicidu na vybrane zastupce pudni fauny. [Effect of long-term application of herbicides on selected representatives of the soil fauna.]** *Agrochemia* 20(2): 43-46; 1980 (13 references) (Czech).

The long term effects of 21 herbicides on nematodes, mites, ticks and ground beetles were studied for 7 yr in 100 m^2 test plots. The herbicides had no marked toxic effects on the soil densities of any of the organisms. The numbers of species present were always highest in the fall.

80-1974. Stoner, A.; Rhodes, H. A.; Wilson, W. T. (Honey Bee Pestic./Dis. Res., Agric. Res. & Educ. Adm.,

USDA, Laramie, WY 82071) **Case histories of the effects of microencapsulated methyl parathion (Penncap-M) applied to fields near honey bee colonies.** *Am. Bee J.* 119(9): 648-654; 1979 (14 references).

Two incidents of catastrophic honey bee mortality due to the use of Penncap-M (encapsulated methyl parathion) on nearby crop fields are reported. A 900-acre corn field in Cass County, Iowa, was sprayed with 1.13 kg/ha Penncap-M for corn borer control. Two apiaries were located 500 yd (457 m) and 1.25 mi (2.01 km) from the sprayed area. Beginning 8 hr after spray, honey bee mortality in the 50 colonies was observed; peak kill was noted 2-3 days after spray. All 50 colonies were declared a total loss. The kill resulted from active foraging of the bees on the corn field. In Fremont County, Wyoming, 0.565 kg/ha Penncap-M were sprayed on 155 acres of alfalfa for aphid control. Severe bee kill was observed 4 days later in 8 beeyards located 0.6-2.7 mi (0.965-4.344 km) from the sprayed field. Dead bees, pollen, wax and honey were collected for analysis and methyl parathion residues in these samples ranged from 0.0 ppm to 1.52 ppm. Of the 265 colonies, 164 were completely destroyed or severely damaged, and 101 were moderately damaged or undamaged. In both cases weather conditions allowed immediate settling of the spray and drift was not a factor.

80-1975. Haux, C.; Larsson, A. (Dep. Zoophysiol., Univ. Gothenburg, Fack S-40033 Gothenburg, Sweden) **Effects of DDT on blood plasma electrolytes in the flounder, *Platichthys flesus* L. in hypotonic brackish water.** *Ambio* 8(4): 171-173; 1979 (22 references).

The effects of DDT on osmotic and ionic regulation in flounders (*Platichthys flesus*) from a brackish water population were studied. Two groups of fish were force-fed gelatin capsules containing DDT on days 3, 7, 10, 15 and 18 to yield a total dose of about 1.5 and 15 mg DDT/kg body wt. Controls were fed identical capsules without DDT. Blood samples were collected and analyzed at 3 and 6 wk. After 3 wk a significant negative correlation existed between the total DDT dosage and the plasma chloride concentration. A slight decrease in plasma osmolality was also evident, but the sodium content was not significantly changed. After 6 wk there were no significant effects on potassium, phosphate and calcium concentration or changes in protein content of blood plasma. After 6 wk there was a significant negative correlation between total DDT concentration and the plasma magnesium concentration. The results indicate that DDT may reduce the ability of the flounder to regulate the osmotic concentration, as well as the concentration of certain ions in a hypotonic environment.

80-1976. Legator, M. S. (Dep. Prev. Med. Community Health, Univ. Texas Med. Branch, Galveston, TX 77550) **Chronology of studies regarding toxicity of 1,2-dibromo-3-chloropropane.** *Ann. NY Acad. Sci.* 329: 331-338; 1979 (17 references).

Major research studies evaluating the safety and possible hazards of 1,2-dibromo-3-chloropropane (DBCP) are reviewed. Specific effects on the testes and reproductive abilities of test species are reported. Evidence of gastric squamous cell carcinoma in rats and mice and mammary gland adenocarcinoma in rats are presented. Also included are the results of mutagenicity studies from 1975 to the present. Sterility and sperm count findings in workers exposed to DBCP, the cessation of production of DBCP in 1977, and possible Y chromosome nondisjunction in human sperm are also presented. It is suggested the problem with DBCP goes beyond the 300 or so industrially exposed workers, as it must also include agricultural workers involved in grain storage and other areas where DBCP was used.

80-1977. Rose, M. S.; Smith, L. L.; Wyatt, I. (Biochem. Mech. Sect., Cent. Toxicol. Lab., ICI Ltd., Alderley Park, Cheshire SK10 4TJ, England) **Toxicology of herbicides with special reference to the bipyridiliums.** *Ann. Occup. Hyg.* 23(1): 91-94; 1980 (11 references).

The development of organic chemicals for use as herbicides in the past 20 yr is discussed. The toxicology of paraquat and diquat is reviewed. Diquat is relatively harmless; problems arising from its use include skin irritation, reversible fingernail damage and occasional nose bleeds. The toxicity of paraquat is far greater and leads to death over a period of weeks if action is not taken soon after ingestion. Rational therapy has been developed based on the selective uptake of paraquat in the lung which occurs over many hours or days after ingestion. The removal of paraquat from the GI tract and the circulation, before the lung is able to accumulate sufficient concentrations that lead to death, is the prime concern of therapy. There is also a current opinion that the primary biochemical lesion involves redox changes rather than lipid peroxidation. It is suggested that this will lead to new approaches in treating the toxic effects of paraquat.

80-1978. Lavaur, E. d.; Siou, G.; Grolleau, G.; Carpentier-Le Sech, J. (Lab. Phytopharm., Cent. Natl., Rech. Agron., INRA, F-78000 Versailles, France) **Etude comparee de l'action du diquat et du paraquat sur la muqueuse digestive de la Souris, du Rat et du Lapin. [Comparative study of diquat and paraquat action on the digestive mucosa of the mouse, rat and rabbit.]** *Ann. Zool. Ecol. Anim.* 11(2): 159-169; 1979 (6 references) (French).

The degree of irritation caused by diquat and paraquat on the mucous membranes of the digestive tracts of mice, rats and rabbits were studied. The products were administered in the form of treated lucerne or drinking water at concentrations lower or equal to contamination induced by standard agricultural practice. Except for salivary

hypersecretion by rabbits no symptoms of irritation were observed in any of the experimental animals. In the lucerne, 211 ppm residue of diquat and 272 ppm of paraquat were found immediately following treatment but the rabbits exhibited no symptoms of intoxication.

80-1979. Schleicher, S. M.; Fricker, M. P. (Dep. Dermatol., Temple Skin & Cancer Hosp., Philadelphia, PA 19140) **Coumarin necrosis.** *Arch. Dermatol.* 116(4): 444-445; 1980 (11 references).

A case is reported of a 75-yr-old woman who developed necrosis of the skin shortly after treatment with the coumarin derivative warfarin sodium (coumadin). The patient received 10 mg of warfarin, followed by 5 mg the following day. Seven days after the second warfarin dose an area of tenderness of the calf developed, and within 24 hr the region became erythematous and indurated. Over the course of 3 wk a necrotic center developed. Warfarin treatment was begun again and a similar necrotic area developed on the other calf. After a diagnosis of warfarin necrosis was made, warfarin therapy was halted and heparin sodium and prednisone administered. Despite treatment, the lesions did not heal and above-the-knee amputation was recommended. The mechanism of coumarin necrosis is unknown, but histologic examination indicates thrombosis rather than hemorrhage as the primary event. No definitive treatment exists for this rare complication of coumarin therapy.

80-1980. Whitfield, M. F. (Dep. Paediatr., Children's Hosp., Western Bank, Sheffield S10 2TH, England) **Chondrodysplasia punctata after warfarin in early pregnancy.** *Arch. Dis. Child.* 55(2): 139-142; 1980 (14 references).

A 21-yr-old white nulliparous woman was treated daily for deep venous thrombosis of the legs with 10 mg of warfarin from 10 wk prior to conception to wk 20 of gestation. After a premature labor at 33 wk gestation, she delivered a live female infant with short trunk and limbs. The infant displayed brachydactyly and hypoplasia of the nasal bridge. Irregular stippled calcification of the bones, feet, upper femora and spine characteristic of chondrodysplasia punctata were found upon X-ray examination. Other clinical tests appeared normal, but the baby was kept hospitalized due to nasal obstruction which intermittently caused cyanosis and bradycardia. At 2 mo of age she was discharged from the hospital and her development was followed. At 2 yr of age she was alert and responsive and had only a slight right hemiparesis and atlanto-axial instability. Growth of the nasal passages eliminated former nasal symptoms, although she remains with short limbs. The teratogenic nature of warfarin administered during early pregnancy is discussed for this and other similar cases in the literature.

80-1981. Arunachalam, S.; Jeyalakshmi, K.; Aboobucker, S. (Dep. Zool., Madurai Kamaraj Univ., PALNI, Tamil Nadu 624602, India) **Toxic and sublethal effects of carbaryl on a freshwater catfish, *Mystus vittatus* (Bloch).** *Arch. Environ. Contam. Toxicol.* 9(3): 307-316; 1980 (20 references).

The effects of carbaryl (1-naphthalenyl methylcarbamate), commonly used in agricultural operations, have been studied with reference to survival, behavior, food intake, growth, and conversion efficiency of the catfish *Mystus vittatus*. At a concentration of 32.5 ppm, carbaryl caused 100% mortality within 24 hr; the 72 hr LC50 was 17.5 ppm. At concentrations of 12.5 ppm and below, it caused no mortalities within 72 hr. But such sublethal concentrations accelerated the swimming activity and increased the frequency of opercular beats. The latter response was dose-dependent. These behavioral changes were the immediate response to the toxicant and were indicators of possible stress. A 27-day exposure to sublethal concentrations of carbaryl led to a decrease in feeding rate and growth rate. The latter decreased from 10.15 mg/g/day (freshwater) to 2.84 mg/g/day (12.5 ppm). The reduced growth and conversion efficiency may be due to the expenditure of more energy for the purpose of maintenance. Therefore, the insecticide is considered to be a metabolic stressor. (Author abstract by permission)

80-1982. Goetz, R.; Schwarz, L. R.; Greim, H. (Ges Strahlen & Umweltforschung, D-8042 Neuherberg/Muenchen, BRD) **Effects of pentachlorophenol and 2,4,6-trichlorophenol on the disposition of sulfobromophthalein and respiration of isolated liver cells.** *Arch. Toxicol.* 44(1-3): 147-155; 1980 (30 references).

The effect of pentachlorophenol (PCP) and 2,4,6-trichlorophenol (2,4,6-T) on the deposition of the hepatodiagnostic dye, sulfobromophthalein (BSP) has been studied in isolated liver cells. PCP (4-6 μM) as well as 2,4,6-T (50-100 μM) interferes with the disposition of BSP. The main effect apparently occurs at the secretion step as both drugs severely impair the release of the glutathione conjugate of BSP into the medium. As a consequence, BSP and its conjugate accumulate in the cell. High doses of PCP did not increase the release of lactate dehydrogenase from the hepatocytes. Concentrations of the 2 phenols which interfere with the secretion of BSP also completely uncouple the oxidative phosphorylation of hepatocellular mitochondria. The dysfunction of liver cells described here may therefore be explained by the effect of PCP and 2,4,6-T on the energy production of the cells. The higher toxicity of PCP as compared to 2,4,6-T observed in our system corresponds well with the higher LD50 of the latter compound. (Author abstract by permission)

80-1983. Wong, S. W.; Chapman, R. B. (Dep. Entomol., Lincoln Coll., Canterbury, New Zealand) **Toxicity of synthetic pyrethroid insecticides to predaceous**

phytoseiid mites and their prey. *Aust. J. Agric. Res.* 30(3): 497-501; 1979 (13 references).

The toxicity of 2 synthetic pyrethroid insecticides, cypermethrin and fenvalerate, to 3 predator mite species and 1 of their prey species, the two-spotted spider mite (*Tetranychus urticae*), was investigated. The predator mite species studied were *Typhlodromus puri* Scheuter, *Typhlodromus occidentalis* Nesbitt, and *Amblyseius fallacis* Garman. Adult female mites were attached to glass microscope slides by double-sided tape, and dipped into a range of 5 serially diluted (0.00001 to 10.0%) solutions of the insecticide. Mortality was assessed after 24 hr, and data were subjected to probit analysis. The LC50 values were calculated and indicated that all 3 species of predator mites were highly susceptible to cypermethrin and fenvalerate, with both insecticides having similar effects. Both insecticides were more toxic to the predator species than azinphos-methyl, which is currently being used, but less toxic to *T. urticae*.

80-1984. Baker, T.; Lowndes, H. E. (Dep. Pharmacol., Med. Coll., Cornell Univ., New York, NY 10021) **Muscle spindle function in organophosphorus neuropathy.** *Brain Res.* 185(1): 77-84; 1980 (19 references).

Diisopropylfluorophosphate (DFP) was injected at 2 mg/kg into the arteries of cats. No changes were noted in walking, jumping or landing 7 days after administration of the chemical. At 14 days post-injection the animals developed a peculiar high-step gait with tip-toe walking in the treated leg. At 21 days post-injection walking and gait changes became more pronounced. By 56 days after injection the jumping, landing, walking and gait were fully recovered. No signs of systemic poisoning were noted during the experimental period. The position sensitivities of secondary but not primary soleus muscle spindles were depressed at 14 days after administration. Both primary and secondary endings had attenuated position sensitivities and elevated thresholds at 21 days post-injection. Spindle function was normal at 56 days. Thus it was concluded that both sensory and motor functions contribute to neurological signs of this neuropathy.

80-1985. Lourens, J. H. M. (Lab. Exp. Entomol., Univ. Amsterdam, NL-1098 SM Amsterdam, The Netherlands) **Inheritance of organochlorine resistance in the cattle tick *Rhipicephalus appendiculatus* Neumann (Acari: Ixodidae) in East Africa.** *Bull. Entomol. Res.* 70(1): 1-10; 1980 (11 references).

The genetics of resistance of three organochlorine resistant strains of *Rhipicephalus appendiculatus* collected from cattle in Kenya, Tanzania and Uganda were studied. The acaricides used were dieldrin (95% purity) and γ-BHC (lindane; 99% purity). In homogeneous dose-mortality studies the response indicated that such larvae have a similar high level of resistance. For heterogeneous sibships, both resistant and susceptible larvae were noted. When crosses occurred between the Uganda strain and the susceptible reference strain a dominant gene exerted a major influence on resistance to both acaricides. In some cases significant deviations from the 1:1 ratio of susceptible:resistant larvae were noted. These deviations occurred in all 3 resistant strains.

80-1986. Sundaramurthy, V. T. (Res. Cent. Biol. Control Coconut Black-headed Caterpillar, Tamil Nadu Agric. Univ., Vaniyambadi 636752, India) **Effects of diflubenzuron on a field population of the coconut black-headed caterpillar, *Nephantis serinopa* Meyrick (Lepidoptera: Celechiidae), and its parasite, *Parasierola nephantidis* (Muesebeck) (Hymenoptera: Bethylidae), in India.** *Bull. Entomol. Res.* 70(1): 25-31; 1980 (16 references).

During March and April, 1978, a 15-yr-old coconut palm grove, heavily infested with *Nephantis serinopa*, was sprayed with 2.5 to 5.0 g AI diflubenzuron. This application impaired the development of *N. serinopa* larvae and caused population decreases by affecting normal ecdysis. The parasite *Parasierola nephantidis* was also significantly affected by the treatment. No eggs were laid in *N. serinopa* larvae by parasites in palms receiving a 20 g/palm dose. Adult parasites from diflubenzuron-exposed larvae suffered morphological deformities in varying degrees. Higher doses caused inhibition of the spinning of cocoons and molting, and other morphological abnormalities. Suggestions to reduce diflubenzuron-induced mortality of the parasite are given.

80-1987. David, D. (Lab. Biol. Anim. CNRS, F-63170 Aubiere, France) **Etude cinetique de la biotransformation et de l'elimination du DDT residuel chez la caille. [Kinetic study of the biotransformation and elimination of residual DDT in the quail.]** *Bull. Soc. Zool. Fr.* 104(1): 53-62; 1979 (13 references) (French).

Gas chromatographic analysis of the 5 constituents of commercial DDT was used to trace DDT biotransformation in quail chicks during and after incubation. DDT applied to the egg shell prior to incubation passed into both the vitellus and embryo. At hatching the average amounts of DDT in quail chicks were higher than in embryos due to vitellus resorption and direct contamination of the chick from treated shells. During post-natal development DDT levels decreased progressively due to metabolization of *p,p'*-DDT to *p,p'*-DDE and decomposition of *o,p'*-DDT.

80-1988. Elliott, R. H.; Cmiralova, D.; Wellington, W. G. (Dep. Plant Sci., Univ. British Columbia, Vancouver V6T 1W5, Canada) **Olfactory repellency of herbicides to foraging honey bees (Hymenoptera, Apidae).** *Can. Entomol.* 111(10): 1131-1136; 1979 (15 references).

Seven herbicides (2,4,5-T; 2,4-DB; 2,4-D; monuron; linuron; picloram and paraquat) were evaluated for their possible olfactory repellency to foraging honey bees (*Apis mellifera ligustica* Spin.). Artificial feeders containing sucrose and herbicide at concentrations of 0, 1000, 2000 and 4000 ppm were set up near the hive entrance. After the first foragers arrived, the number of bees which fed from each dish was recorded every 5 min for 25 min. All herbicides except paraquat significantly reduced feeding incidence, and were concluded to be olfactory and gustatory repellents. As the concentration of each herbicide increased there was a significant reduction in the number of feeding bees. The most repellent herbicide was 2,4,5-T, followed by 2,4-DB, linuron, picloram, 2,4-D and monuron. The results are discussed in relation to the impact of herbicide application on honey production, brood development, pollination and foraging behavior.

80-1989. Hydorn, S. B.; Rabeni, C. F.; Jennings, D. T. (Maine Coop. Fish. Unit., Maine, Univ. Orono, ME 04469) **Effect of forest spraying with acephate insecticide on consumption of spiders by brook trout (*Salvelinus fontinalis*).** *Can. Entomol.* 111(10): 1185-1192; 1979 (15 references).

Data is presented on spiders and other arthropods found in the stomachs of brook trout following treatment of coniferous forest with acephate. Two streams in the spray area (560 g acephate/ha) and a control stream 5.5 km outside the treated zone were studied. Brook trout were collected from all streams on several dates prior and subsequent to spraying, and gut contents were analyzed. Fish exposed to spray within 48 hr of capture showed significant increase in consumption of the non-target terrestrial arthropods Coleoptera and Araneae. It is suggested that insecticide stress on arboreal spiders caused some to fall from overhanging branches into streams, where they were eaten by fish. In a separate study, it was observed that spiders caged in an acephate-sprayed forest had low survival and behaved abnormally.

80-1990. DiGiovanni, J.; Berry, D. L.; Gleason, G. L.; Kishore, G. S.; Slaga, T. J. (McArdle Lab. Cancer Res., Univ. Wisconsin, Madison, WI 53706) **Time-dependent inhibition by 2,3,7,8-tetrachlorodibenzo-*p*-dioxin of skin tumorigenesis with polycyclic hydrocarbons.** *Cancer Res.* 40(5): 1580-1587; 1980 (55 references).

Studies were performed to determine the inhibition of tumor inducing substances by TCDD. Mice were treated with TCDD at various times before and after treatment with 7,12-dimethylbenz(*a*)anthracene (DMBA), 3-methylcholanthrene (MCA), benzo(*a*)pyrene (BaP) and BaP-diol-epoxide. The activities of enzymes related to tumor inhibition (AHH, EH, UDPGT and GST) were also analyzed as a function of treatment with TCDD and congeners of TCDD [2,4,3',4'-tetrachlorobiphenyl (TCB), 2,4,5,2',4',5'-hexachlorobiphenyl (HCB) and 2,6-dichlorodibenzo-*p*-dioxin (DCDD)] after tumor initiation by DMBA. TCDD applied either 5 min before or 1 day after initiation had no effect. However, when it was applied 3 days prior to initiation a marked reduction in tumors was observed. Of the congeners of TCDD, TCB inhibited tumor initiation by DMBA, but HCB and DCDD had little or no effect on the tumor response. The activity of the enzymes UDPGT and AHH were increased by TCDD and TCB, but HCB and DCDD had little or no effect on the activity of these enzymes.

80-1991. Anonymous **Researcher questions Kepone's role in human cancer.** *Chem. Week* 126(15): 22-23; 1980 (1 reference).

Researchers at the Medical College of Virginia (MCV) have uncovered evidence that Kepone (chlordecone) is metabolized differently in rats and humans. Their findings indicate that rats and mice lack the enzymes that humans possess which reduce Kepone to a form that is readily eliminated from the body. These observations suggest that rats and mice may be inappropriate as laboratory animals to test for the carcinogenic potential of Kepone in humans. An MCV scientist speculates that Kepone may act merely as a promoter of liver cancer that occurs spontaneously in rats and mice, and may not actually be a direct carcinogen in these animals when given in large doses for long periods of time. Workers exposed to Kepone during its manufacture at a Hopewell plant were extensively tested in 1975. Among the important findings of this epidemiology study was the discovery of the correlation between Kepone blood levels and adipose tissue levels. Other surveys of residents near the Tidewater and James River areas who ate Kepone-contaminated seafood have found only minute quantities of the pesticide in the blood. It was also noted that as the level of Kepone in the blood declined, so did all signs of Kepone poisoning, suggesting that a threshold level for the pesticide may exist below which it is harmless. Despite these new findings, it is speculated that changes in the current federal maximum allowable levels of Kepone in seafood are unlikely.

80-1992. Zitko, V. (Fish. & Environ. Sci., Biol. Stn., Dep. Fish. & Oceans, St. Andrews, New Brunswick EOG 2XO, Canada) **The uptake and excretion of mirex and dechloranes by juvenile Atlantic salmon.** *Chemosphere* 9(2): 73-78; 1980 (8 references).

Dry fish food was coated with a mixture of mirex and flame-retardant dechloranes (0.59 μg mirex/g) and given to fish kept in running water at 10°C for 42 days. Fish were then fed uncontaminated food for up to 71 days. Fish were also exposed to the mixture in water for 96 hr at 10°C and were then transferred to clean running water for up to 192 hr. The fish and water were sampled periodically and the concentrations of the individual compounds in the

water and fish and the excretion rates were calculated. The average concentration of mirex in the water at 96 hr was calculated to be 0.375 μg/l. Mirex and dechlorane No. 602 were absorbed from water and from food. Mirex concentrations increased with increased exposure via water; 10.5 mg/g wet wt at 12 hr and 31.4 ng/g wet wt at 96 hr. Excretion in water-exposed fish was 24.9 (ng/g wet wt) at 25.5 hr, 26.9 at 102 hr and 2.18 at 192 hr. Mirex uptake from food was 41.0 at 15 days, 79.4 at 28 days and 75.0 at 42 days. Mirex excretion from feed-exposed fish steadily decreased; 71.9 (ng/g wet wt) at 10 days and 42.0 at 71 days. The accumulation constant of mirex from water was calculated to be 84 and, after correction for excretion, was calculated to be 650. The uptake rate constant for mirex was calculated to be 0.92/hr.

80-1993. McLeese, D. W.; Zitko, V.; Metcalfe, C. D.; Sergeant, D. B. (Fish. & Environ. Sci., Biol. Stn., Dep. Fish. & Oceans, St. Andrews, New Brunswick, E0G 2X0, Canada) **Lethality of aminocarb and the components of the aminocarb formulation to juvenile Atlantic salmon, marine invertebrates and a freshwater clam.** *Chemosphere* 9(2): 79-82; 1980 (9 references).

Aminocarb formulations containing 21.7% (by weight) aminocarb, 51.2% nonylphenol, and 27.1% of 585 oils (primarily low molecular weight alkanes and naphthalenes), were used in toxicity tests on freshwater and marine species. The 96 hr lethal thresholds of aminocarb were 8.7 mg/l for *Salmo salar* and 0.2 mg/l for *Crangon septemspinosa*. After 144 hr the lethal threshold was > 5.0 mg/l for *Anodonta cataractae*. The lethal concentrations of nonylphenol to *Homarus americanus* and *Mya arenaria* and of the 585 oils to several invertebrate species were also determined. The toxicity of the aminocarb formulation to the salmon was due almost entirely to the presence of nonylphenol. For *Crangon* shrimp the nonylphenol was slightly more toxic than aminocarb. The order of sensitivity to the formulation was marine crustaceans > salmon > bivalves; the bivalves were the most resistant to the toxic effects of the formulation and its components. The 585 oils did not contribute significantly to the toxicity of the formulation. No adverse ecological effects have been noted to occur from using aminocarb formulations in actual spray operations.

80-1994. Publicover, S. J.; Duncan, C. J.; Smith, J. L. (Dep. Zool., Univ. Liverpool, Liverpool L69 3BX, England) **The action of lindane in causing ultrastructural damage in frog skeletal muscle.** *Comp. Biochem. Physiol. C* 64(2): 237-241; 1979 (15 references).

The insecticide lindane has been shown to cause extensive damage (at 5×10^{-5} *M*) to the myofilaments of frog skeletal muscle. The effect is much greater in the presence of extracellular Ca^{2+} from intracellular sites in the muscle. It has a similar dual effect at presynaptic terminals, modifies oxidation in isolated frog liver mitochondria and acts at the muscle membrane, as shown by recordings of the amplitude of the MEPP's. (Author abstract by permission)

80-1995. Schimmel, S. C.; Hamaker, T. L.; Forester, J. (Environ. Res. Lab., US EPA, Gulf Breeze, FL 32561) **Toxicity and bioconcentration of EPN and leptophos to selected estuarine animals.** *Contrib. Mar. Sci.* 22: 193-204; 1979 (16 references).

The results of toxicity and bioconcentration studies on the insecticides EPN and leptophos are reported. The purposes of the study were to determine the acute toxicity of the insecticides to several estuarine species on flowing seawater, to determine the accumulation of the insecticides in tissues of animals surviving a 96-hr test, to evaluate the chronic (entire life cycle) toxicity of leptophos and EPN to the estuarine mysid (*Hysidopsis bahia*), and to determine the uptake rates, depuration rates, and the bioconcentration factors of EPN using pinfish (*Legodon rhomboides*) and of leptophos using spot (*Leiostomus xanthurus*). EPN and leptophos were found to be acutely toxic to both crustaceans and fish, with the commercial pink shrimp being the most sensitive species tested. The 96-hr LC50 values for EPN were found to be 3.44 μg/l for *Mysidopsis bahia*, 0.29 μg/l for *Penaeus duorarum* (pink shrimp), 188.9 μg/l for *Cyprinodon variegatus* (sheepshead minnow), 18.3 μg/l for *Lagodon rhomboides*, and 25.6 μg/l for *Leiostomus xanthurus*. The 96-hr LC50 values determined for leptophos were 3.16 μg/l for *M. bahia*, 1.88 μg/l for *P. duorarum*, and 4.06 μg/l for *L. xanthurus*. In bioconcentration studies, *L. rhomboides* exposed to EPN for 26 days bioconcentrated the EPN to 707 × that measured in the exposure water, while fish exposed to leptophos bioconcentrated that insecticide to only 68 × the concentration in the exposure water. In chronic toxicity studies using *M. bahia*, significant mortality and fewer young were produced by the EPN level of 4.13 μg/l. In the leptophos testing, significant mortality occurred in concentrations ⩾ 3.63 μg/l, and fewer young were produced in concentrations ⩾ 1.77 μg/l. It is concluded that if either EPN or leptophos contaminate an estuarine environment in concentrations ⩾ 1.0 μg/l, acute toxicity rather than chronic toxicity or bioconcentration would produce the most profound effects in crustaceans and possibly fish.

80-1996. Hussain, M. (Simon Fraser Univ., Burnaby, British Columbia V5A 1S6, Canada) **Studies on incipient and delayed neurotoxic effects of some organophosphorus insecticides.** *Diss. Abstr. Int. B* 40(9): 4083-4084; 1980.

Electromyography (EMG) and blood cholinesterase (ChE) activities were studied in humans and rats; and delayed neurotoxicity (DN) of leptophos was investigated with rats and chickens. Low levels of diazinon (0.5 and 5.0 mg/kg) and parathion (0.1 to 1.0 mg/kg) were

given orally to rats each day for 26 wk. EMGs from the anterior tibialis muscle and the activities of erythrocyte AChE and plasma ChE were measured every 2-4 wk. After 26 wk, the rats were killed, and resting and action potentials of single muscle fibers of the diaphragm were measured. Agricultural workers were monitored monthly for 7 mo by EMG of the abductor pollicis muscle and by blood ChE determinations. Low levels of leptophos (0.5 and 5.0 mg/kg) were given po to rats and chickens each day for 26 wk. AChE and ChE were determined. After 26 wk the animals were killed and the histological alterations in the spinal cord and sciatic nerve were assessed. Activity of neurotoxic esterase (NTE) was determined in the brain and spinal cord. No abnormalities in EMGs and no changes in the resting and action potentials of single muscle fibers from the diaphragm could be detected in rats exposed to diazinon and parathion. Both insecticides produced decreased AChE and ChE activities. In agricultural workers, depressions in both EMG and AChE were detected and there was greater variation in EMG and AChE values than in controls. In occupationally exposed workers, EMG was found to be as sensitive an indicator as the measurements of erythrocyte AChE activity. The higher dose level of leptophos induced DN in chickens but not in rats. AChE activities of chickens decreased at first and then increased for most of the experiment, while AChE activities of rats were depressed. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms)

80-1997. Tubea, B. I. (Oklahoma State Univ., Stillwater, OK) **The effects of nutrient, pH and herbicide levels on algal growth.** *Diss. Abstr. Int. B* 40(10): 4596; 1980.

Herbicides enter water systems, whether they are directly applied into water as aquatic herbicides or indirectly drain from cultivated farm lands. Water systems also have different nutrients or pH levels. Experiments were designed to determine the impacts of herbicides, nutrients, or pH levels on algal growth. The growth determinations were made by using stock cultures of *Chlorella pyrenoidosa* Chick and *Lyngbya bergei* Dyar. The herbicides used were picloram, prometryne, dinoseb, and fluometuron at 0.1, 1.0 or 10.0 μM. Known combinations of uni-algae cultures, nutrient of pH levels and herbicide concentrations were placed in 50 ml Erlenmeyer flasks. There were no differences in growth rates of algae with the P and K levels used. High levels of Ca and Mg increased growth rates. High levels of N and pH increased the growth of all the algae tested except the pH treatments of *C. pyrenoidosa* when combined with prometryne or fluometuron. Picloram had no effect on growth of any of the algae tested. Dinoseb had an inhibitory effect on *L. bergei*, but no inhibitory effect on *C. pyrenoidosa*. In general, growth inhibition increased as the herbicide concentrations increased, particularly with prometryne and fluometuron. Significant interactions among herbicides and nutrient levels were found for N and pH. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8003609)

80-1998. Reilly, D. (Sch. Med. & Dent., Univ. Rochester, Rochester, NY) **Drug interactions with disulfiram.** *Drug Therapy* 10(4): 142, 146-147; 1980 (17 references).

The known interactions of drugs with disulfiram are discussed. In addition to its use as an insecticide and fungicide, disulfiram is also used clinically in the treatment of alcoholism. Phenytoin and warfarin caused decreased hepatic metabolism in the presence of disulfiram. Drowsiness due to reduced plasma clearance occurss as a result of its interaction with valium or chlordiazepoxide. Valium and ascorbic acid protect the acetaldehyde oxidizing enzymes which results in a less severe alcohol-disulfiram reaction. When experimental animals were subjected to combinations of disulfiram and barbiturates, morphine, barbitone, amphetamines or meperidine mortality resulted. However, the clinical significance of the interactive effect of the compounds in humans remains to be investigated.

80-1999. Dinokeva, K. (Inst. Hyg. & Occup. Dis., Med. Acad., Sofia, Bulgaria) **Vliyanie na kombinatsiya ot tri pestitsida vurkhu sensibilizatsiyata na morski svincheta s ovalbumin. [Effect of the combination of three pesticides on the sensitization of guinea pigs to ovalbumin.]** *Eksp. Med. Morfol.* 18(1): 22-24; 1979 (Bulgarian).

The effect of intragastric treatment with a combination of 3 pesticides on sensitization to ovalbumin was studied in guinea pigs. Animals were treated with the combination of zineb (12.5 mg/kg = threshold dose), carbaryl (1.5 mg/kg = 2 × threshold dose), and tribufon (butonate; 5 mg/kg = threshold dose). Another group was treated with the combination of zineb (125 mg/kg), carbaryl (1.5 mg/kg), and tribufon (5 mg/kg). The pesticides were administered in starch emulsion via a gastric probe on empty stomach in the morning, daily for 6 mo. The control group received starch emulsion only. After the 6 mo treatment, the animals were sensitized with ovalbumin (1 ml sc and 1 ml ip), and a challenge dose (2 ml) was administered ip 20 days later. No differences were found in the sensitization of the animals treated with the combination of the 3 pesticides and those treated with equal doses of the same pesticides separately.

80-2000. Djirkoleva, T.; Dishovski, H.; Rusev, G. (Vissh. Vet. Med. Inst., Sofia, Bulgaria) **Promeni v naprechnonabrazdenata muskulatura pri tretirane s pestitsida neguvon i reaktivatora TMB-4. [Changes in striated muscles after treatment with the pesticide neguvon and**

reactivator TMB-4.] *Eksp. Med. Morfol.* 18(1): 31-35; 1979 (14 references) (Bulgarian).

The effect of neguvon (trichlorfon; 200 mg/kg, corresponding to 50% of LD50), given po in a single dose, on the contractility of the transverse striated muscles was studied in 60 male rats. Neguvon caused a significant reduction of the contractility of the transverse striated muscles and of the precipitation of myosin B. The cholinesterase reactivator TMB-4, administered in a dose of 20 mg/kg im 1 hr after neguvon, normalized the contractility on the third day after treatment, and the precipitation of myosin B 12 days after treatment.

80-2001. Abban, E. K.; Samman, J. (Inst. Aquatic Biol., CSIR, Achimota, Ghana) **Preliminary observations on the effect of the insect larvicide Abate on fish catches in the River Oti, Ghana.** *Environ. Pollut.* 12(4): 307-311; 1980 (12 references).

Abate (temephos) was aerially applied 300 m upstream of the *Simulium* breeding site and about 800 m upstream of the gill net sampling site on the River Oti in Ghana. Abate levels were expected to be 0.05-0.10 ppm for 10 min in the water flowing past the *Simulium* breeding site. Fish were caught at 6 hr intervals for a 48 hr period and were identified, counted and weighed. Fewer numbers and species of fish were caught during the daytime than at night while the study was in progress. Less fish were netted prior to Abate application than after application of the larvicide. The only effect of the application was observed during the first 5 min in the erratic overt movements of some fish. No fish mortality occurred due to Abate treatment. Results of this field experiment were used in conjunction with a larger study of the effects of Abate on the fish of the Volta river basin.

80-2002. Poklis, A.; Kutz, F. W.; Sperling, J. F.; Morgan, D. P. (Dep. Pathol., Sch. Med., St. Louis Univ., St. Louis, MO 63104) **A fatal diazinon poisoning.** *Forensic Sci. Int.* 15(2): 135-140; 1980 (13 references).

The body of a 54-yr-old female who had committed suicide by ingestion of an estimated 22 g of Ferti-lome (AI 10% diazinon) was autopsied and examined for levels of the insecticide in various tissues and body fluids. Adipose tissue, bile, blood, brain, stomach contents, kidney, and liver samples were analyzed by gas-liquid chromatography. Plasma cholinesterase activity was 0.0 Rappaport units/ml (normal levels for adults range from 40-80 Rappaport units/ml). Diazinon was detected in all samples analyzed with the highest levels occurring in stomach contents, blood and bile. Since no other gross anatomical or histological abnormalities were discovered, the amount of diazinon ingested in this case was deemed lethal.

80-2003. Brigelius, R.; Hashem, A. (Inst. Pharmakol., Fachber. Tiermed., Univ. Munchen., D-8000 Munich 22, BRD) **Inhibition of paraquat-induced lipid peroxidation by the superoxide dismutase active copper complex $Cu(Tyr)_2$ in the isolated perfused rat liver.** *Hoppe-Seyler's Z. Physiol. Chem.* 361(3): 225; 1980 (1 reference).

Livers from 3-mo-old male Wistar rats were perfused with Krebs-Henseleit buffer (control), buffer containing 1 m*M* paraquat, or buffer containing 1 m*M* paraquat and 5×10^{-5} *M* $Cu(Tyr)_2$. $Cu(Tyr)_2$ (an artificial superoxide dismutase) was shown by Cu analysis to penetrate liver cell membranes, and inhibited some paraquat-induced effects. It decreased the diene-absorption of mitochondrial and microsomal lipids and abolished the paraquat-induced decrease in phospholipid content, but did not completely inhibit the GSSG-release caused by paraquat. It is concluded that paraquat induces lipid peroxidation involving superoxide radicals.

80-2004. Walter, Z.; Czajkowska, A.; Lipecka, K. (Dep. Biochem., Inst. Biochem. & Biophys., Univ. Lodz, Banacha 12/16, PL-90237, Poland) **Effect of malathion on the genetic material of human lymphocytes stimulated by phytohemagglutinin (PHA).** *Hum. Genet.* 53(3): 375-381; 1980 (32 references).

Cultures of human lymphocytes stimulated by phytohemagglutinin (PHA) were used in studies to test the effect of malathion on cell survival, DNA and RNA content, and chromosome structure. Malathion at levels of 10, 30, 50 or 70 μg/ml was added to cultures 24 hr before the introduction of PHA, or 4, 18 or 48 hr after PHA introduction. Cultures were incubated for 72 hr after PHA treatment. Cell density and cell damage were assessed, and cytogenetic studies were carried out. Nucleic acid content was determined by a spectrophotometric method. Results indicated a direct cytotoxic effect of malathion on PHA-stimulated human lymphocytes, with the effect dependent on the dosage and timing of malathion treatment. In cultures treated with malathion 24 hr prior to PHA addition, the relative survival of cells was decreased by 12, 18, 22 and 48% by 10, 30, 50 and 70 μg malathion/ml, respectively. The same doses of malathion applied 4 hr after PHA lowered the relative survival of lymphocytes by 5, 9, 11 and 32%, respectively. A concentration of 10 μg/ml malathion increased RNA and DNA fractions in lymphocyte cultures, while 50 and 70 μg/ml malathion induced a significant decrease in RNA and DNA content. Malathion induced chromosomal alterations, but there was no correlation between dose and level of chromosome aberrations. This study indicates that malathion is cytoxic for PHA-stimulated human lymphocytes and that it inhibits the synthesis of nucleic acids in these cells.

80-2005. Bluzat, R.; Seuge, J. (Lab. Zool., Univ. Paris-Sud, Cent. Orsay, F-91405 Orsay, France) **Etude de la tox-**

icite chronique de deux insecticides (carbaryl et lindane) a la generation F_1 de *Lymnea stagnalis* L. (Mollusque gasteropode pulmone). I. Croissance de coquilles. [Study of the chronic toxicity of two insecticides (carbaryl and lindane) to the F_1 generation of *Lymnea stagnalis* L. (pulmonate gastropod mollusk). I. Shell growth.] *Hydrobiologia* 65(3): 245-256; 1979 (9 references) (French).

The effect of carbaryl and lindane on the shell growth of the F_1 generation of the snail *Lymnea stagnalis* was studied. A 2 ppm concentration of carbaryl slowed down shell growth slightly in young snails. A concentration of 4 ppm was lethal to young snails but tolerated by older ones, and slowed shell growth markedly. The F_1 generation exhibited tolerance to lindane explained by the chronic preceding intoxication of their parents (the F_0 generation). Shell growth was impaired, with inhibition proportional to concentration (1 and 2 ppm). The effects of lindane were found to be reversible.

80-2006. Seuge, J.; Bluzat, R. (Lab. Zool., Univ. Paris-Sud, Cent. Orsay, F-91405 Orsay, France) **Etude de la toxicity chronique de deux insecticides (carbaryl et lindane) al la generation F_1 de *Lymnea stagnaleis* L. II. Consequences sur la potential reproducteur. [Study of the chronic toxicity of 2 insecticides (carbaryl and lindane) to the F_1 generation of *Lymnea stagnalis* L. II. Effects on the reproductive capacity.]** *Hydrobiologia* 66(1): 25-32; 1979 (6 references) (French).

The effects of 1 and 2 ppm levels of carbaryl and lindane on the fertility of the F_1 generation of *Lymnea stagnalis* snails were studied by counting the numbers of eggs laid and egg-laying frequency. Egg size was not related to insecticide concentration. Carbaryl reduced fertility proportionately with concentration at any given age of the snails and is attributed to the slow growth of the snails. Lindane reduced fertility in a similar manner, but its effect was much more pronounced. A 2 ppm lindane concentration disturbed the reproductive capacity of the snails more severely in the F_1 generation than in the F_0 generation. The phenomenon was found to be reversible.

80-2007. Samman, J.; Thomas, M. P. (Inst. Aquatic. Biol., Achimota, Ghana) **Observations on the effect of the aerial spraying of Abate, used in the control of *Simulium* larvae, on the drift rates of microcrustacea and Chaoboridae in the River Oti, Ghana.** *Int. J. Environ. Stud.* 14(1): 43-47; 1979 (21 references).

Drift rates of non-target zooplanktonic organisms within 24 hr of river applications of Abate (temephos) were investigated. Three drift nets (pore size 310 μm) were placed side-by-side in the River Oti for 10 min periods at hourly intervals for 24 hr prior to, and for 24 hr after, spraying. Abate was sprayed 300 m upstream from the collection site. Concentrations expected at the river sampling site after spraying were 0.01-0.05 ppm for 10 min. The river flow rate was 0.80 m/sec. Cladocera, Copepoda and Chaoboridae were collected and counted. Drift rates before spraying of each order indicated distinct periodicity. Drift rates peaked about 2 hr after sunset and again, generally, from midnight to sunrise. Within 1 hr of Abate spraying catastrophic drifting of zooplankton was observed. Zooplankton collected after spraying were dead or dying while those collected 24 hr previously were alive. From one hr after spraying until sunset no zooplankton were collected. The drift rates increased after sunset, and the patterns of drift were different from those observed the night before spraying. Numbers of Cladocera collected the night before spray were 33/sample and the night after spray were 55/sample; for Copepoda, these numbers were 28 and 60, respectively; and for Chaoboridae, 5 and 10, respectively. It is concluded that the aerial spraying of Abate greatly affects zooplankton in river surface waters, but not those organisms in the lower strata of the river, at the time of spraying.

80-2008. Brown, K. W.; Anderson, D. C.; Jones, S. G.; Deuel, L. E.; Price, J. D. (Dep. Soil & Crop Sci., Texas A&M Univ., College Station, TX) **The relative toxicity of four pesticides in tap water and water from flooded rice paddies.** *Int. J. Environ. Stud.* 14(1): 49-53; 1979 (19 references).

Six-wk-old channel catfish (*Ictalurus punctatus*) were exposed to various concentrations of propanil, molinate, carbofuran, or carbaryl. The median tolerance limitations (TLM) of the fish to the pesticides were determined in either tap water or in 2 samples of flood water from a rice paddy which had been previously treated with these pesticides. The 24, 48 and 96 hr TLM concentrations in tap water tanks were 20.81, 14.51 and 7.94 ppm for propanil, respectively; 33.25, 33.24 and 33.25 ppm, respectively, for molinate; 0.56, 0.52 and 0.51 ppm, respectively, for carbofuran; and 6.71, 1.30 and 1.30 ppm for carbaryl, respectively. In all cases, the 96-hr TLM concentrations in paddy water I were less than those found in either tap water tanks or in the paddy water II samples. All of the pesticides were found to be more toxic in field waters than in tap water.

80-2009. Angus, K. W.; Greig, A. (Dep. Pathol., Moredun Res. Inst., Edinburgh EH17 7HG, Scotland) **Renal and hepatic calcification in a lab poisoned by an anthelmintic dose of carbon tetrachloride.** *J. Comp. Pathol.* 89(4): 605-608; 1979 (8 references).

Necropsy findings on the carcass of a lamb, which had survived 8 days following an anthelmintic dose of carbon tetrachloride, revealed severe pulmonary congestion and edema, with multiple subpleural, epicardial and abomasal petechiation. The liver was enlarged and pale. The kidney was pale and mottled. The spleen and carcass

lymph nodes were enlarged. All deposits were heavily impregnated with calcium salts.

80-2010. Salvisberg, W.; Neumann, R.; Voss, G.* (Agric. Div., Ciba-Geigy Ltd., Basel, Switzerland) **Chlordimeform: mode of toxic action in various development stages of *Spodoptera littoralis*.** *J. Econ. Entomol.* 73(2): 193-196; 1980 (6 references).

Several toxicity tests were carried out with eggs, larvae, and adults of *Spodoptera littoralis* (Boisduval) to evaluate the mode of toxic action of chlordimeform. When applied as vapor, chlordimeform caused an increasing mortality with proceeding embryological development. Larvae treated the same way immediately after hatching were much less sensitive to the ovicide-insecticide than they were before hatching. Removing treated embryos from their own egg shell prior to hatching resulted in strongly reduced percentages of mortality. Egg toxicity values were greatly influenced by the surface on which the eggs were laid. Filter paper or foliage served as a reservoir from which chlordimeform was released between the time of application (vapor, solution) and hatching. When treated eggs were transferred to nontreated substrates, mortality values decreased drastically. Under such conditions, chlordimeform also was released from the egg surfaces, particularly in moving air. Chlordimeform at 0.1 of the LD50 caused symptoms of hyper-excitation in the majority of test insects. This resulted in abnormal patterns of egg-laying, in a reduced number of eggs, and in lower fertility. (Author abstract by permission)

80-2011. Wang, T. C.; Plapp, F. W., Jr. (Dep. Entomol., Texas A&M Univ., College Station, TX 77843) **Genetic studies on the location of a chromosome II gene conferring resistance to parathion in the house fly.** *J. Econ. Entomol.* 73(2): 200-203; 1980 (18 references).

Genetic tests were performed to determine the order of 3 chromosome II visible recessive mutants in *Musca domestica* L. and to locate a gene conferring resistance to parathion in relation to the mutants. Crosses between mutant strains and a susceptible wild type strain indicated a gene order of aristapedia-carnation eye-stubby wing. In crosses between mutant strains and the resistant strain, the gene order was R (for resistance) aristapedia-stubby wing-carnation eye. Thus, the gene order was not the same in the 2 sets of crosses. In addition to the change in gene order, the distance between the mutants was reduced in the parathion resistant X mutant crosses. The results indicate that a suppression of crossing over, most probably in the form of an inversion, occurs on chromosome II in the resistant strain. The relationship of this anomaly to resistance is unknown. (Author abstract by permission)

80-2012. Georghiou, G. P.; Pasteur, N.; Hawley, M. K. (Div. Toxicol. & Physiol., Dep. Entomol., Univ. California, Riverside, CA 92521) **Linkage relationships between organophosphate resistance and a highly active esterase-B in *Culex quinquefasciatus* from California.** *J. Econ. Entomol.* 73(2): 301-305; 1980 (5 references).

A highly active esterase associated with resistance to temephos, chlorpyrifos, parathion, methyl parathion, malathion, and fenthion in the southern house mosquito from California is coded by a single gene with 2 alleles: *Est-B^A*, coding a strongly staining esterase; and *Est-B^o*, coding a weakly staining esterase. *Est-B^A* was found to be dominant over *Est-B^o*. *Est-B* gene is localized on the same chromosome as the gene coding resistance and there is a strong possibility that these 2 genes are identical since no recombinants were observed. (Author abstract by permission)

80-2013. Shour, M. H.; Crowder, L. A. (Dep. Entomol., Univ. Arizona, Tucson, AZ 85721) **Effects of pyrethroid insecticides on the common green lacewing.** *J. Econ. Entomol.* 73(2): 306-309; 1980 (15 references).

Third instars of *Chrysopa carnea* Stephens can tolerate a wide range of doses of fenvalerate, permethrin, *cis*- and *trans*-permethrin. Larvae exhibited marked tolerance to all pyrethroids over a 72 hr period when dosed topically with 250 μg insecticide/insect. Larval survivorship, adult emergence, and fecundity were unaffected by permethrin but not by fenvalerate at the 1000 μg/g level through one generation (larva to larva); female longevity, however, was decreased by permethrin. The ED50 value (paralysis, failure to pupate, knockdown, and mortality) for fenvalerate was ca. 1000 μg/g whereas ED50 values for the other compounds could not be determined but would be greater than 25,000 μg/g. (Author abstract by permission)

80-2014. Cantwell, G. E.; Lehnert, T. (Bioenviron. Bee Lab., Fed. Res. Sci. & Educ. Adm., USDA, Beltsville, MD 20705) **Lack of effect of certain microbial insecticides on the honeybee.** *J. Invertebr. Pathol.* 33(3): 381-383; 1979 (5 references).

Microbial insecticides were given to individual and colonies of honeybees, *Apis mellifera*, to determine the risk to bees of using these insecticides. Two replicates of 24 bees/group, or two colonies of 3000 bees each, were given *Autographa californica, Heliothis virescens, Hirsutella thompsonii, Bacillus moritai* or *B. sphaericus* in sucrose water and individual fatalities were observed. No significant difference in mortality occurred in any of the treated groups. The incidence of infection or other pathological conditions were also not significant, nor were there any significant abnormalities in colony egg production, brood rearing, worker and queen mortality, or general behavior.

80-2015. Miller, T. L.; Deinzer, M. L. (Dep. Agric. Chem. & Environ. Health Sci. Cent., Oregon State Univ.,

Corvallis, OR 97331) **Effects of nonachloropredioxin and other hydroxychlorodiphenyl ethers on biological membranes.** *J. Toxicol. Environ. Health* 6(1): 11-25; 1980 (38 references).

Human erythrocyte membranes were exposed *in vitro* to chlorophenolic contaminants of PCP preparations, and pure and technical grade PCP. The hemolytic strength of the compounds tested was found to be strongest in the hydroxynonachlorodiphenyl ethers, followed by the trichlorodiphenyl ethers, then the technical grade PCP and lastly the pure PCP. Hemolytic potency of the PCP contaminants was found to depend not only on the degree of chlorination but also on the position of the hydroxyl group. However, at lower levels, these chlorophenolic compounds reduce the hypotonic hemolysis of the erythrocytes. Morphological studies revealed a change in erythrocyte structure in the concentration range of chlorophenolic compounds which offers maximum protection against hypotonic hemolysis. Intact erythrocytes exposed to chlorophenolic compounds exhibited a prelytic efflux of potassium ions in an order of efficacy that paralleled their hemolytic effect. These findings indicate that the chlorophenolic PCP contaminants are membrane-active compounds which may directly alter the traits of biological membranes.

80-2016. Pollock, G. A.; Kilgore, W. W. (WOI Reg. Program Vet. Med., Univ. Idaho, Moscow, ID 83843) **Toxicities and description of some toxaphene fractions: isolation and identification of a highly toxic component.** *J. Toxicol. Environ. Health* 6(1): 115-125; 1980 (15 references).

Technical grade toxaphene was fractionated into 13 components which were identified by gas liquid chromatography and tested for their toxicity to houseflies and mice. Topical application of the fractions in acetone to houseflies resulted in acute LD50 values ranging from 21 to over 246 mg/kg. Relative toxicities in houseflies ranged from 0.6 to greater than 7.5 mg/kg. In mice, acute toxicities ranging from 20 to 67 mg/kg were observed when certain fractions were given ip in dimethyl sulfoxide. Subfractionation was performed on the most toxic toxaphene fraction. The six resulting components yielded LD50 values ranging from 10 to 74 mg/kg in houseflies. GC-MS analysis showed the most toxic subfraction to be a mixture of 2,2,5-endo-6-exo,8,8,9,10-octachlorobornane and 2,2,5-endo-6-exo,8,9,9,10- octachlorobornane.

80-2017. Pollock, G. A.; Kilgore, W. (WOI Reg. Program Vet. Med., Univ. Idaho, Moscow, ID 83843) **Excretion and storage of ^{14}C toxaphene and two isolated ^{14}C toxaphene fractions.** *J. Toxicol. Environ. Health* 6(1): 127-140; 1980 (11 references).

Female Sprague-Dawley rats were orally dosed with 10 mg/kg ^{14}C-toxaphene and the 7 day urinary and fecal excretions of toxaphene, polar fraction 7 and nonpolar fraction of toxaphene were determined. Total 7 day excretion of toxaphene was 58.2% of the administered dose while the urinary and fecal levels of toxaphene were 22.5 and 35.7% of the total dose, respectively. Total excretion of fraction 2 and 7 were 69.4 and 65.0%, respectively, of the administered dose. Overall, the excretion order of the compounds was fraction 2 > toxaphene > fraction 7. Urinary extracts contained ^{14}C activity which was more polar than the parent compounds, suggesting that toxaphene is metabolized before it is excreted. Tissue levels of toxaphene were below 0.2 ppm in all samples except adipose tissue, where significant levels of the pesticide were found. TLC and autoradiography analysis of fat extracts showed that the extracted activity was different from the parent material. An increased polarity was characteristic of the residual toxaphene in treated rats. Rats given fraction 2 displayed this fraction plus two more spots of higher polar activity which comprised 11% of the total activity. Two additional spots also appeared from the fat of rats given fraction 7, but these spots were not as polar as fraction 7 and perhaps represented metabolites more persistent than fraction 7 of toxaphene.

80-2018. Didenko, L. N.; Levchenko, E. A.; Roslavtseva, S. A. (All-Union Res. Inst. Select. & Genet., Odessa, USSR) **Poiavlenie resistentnoi k khlorofosu populiatsii ambarnogo dolgonosika. [Appearance of a population of granary weevil resistant to chlorophos.]** *Khim. Sel'sk. Khoz.* 18(2): 29-30; 1980 (15 references) (Russian).

The rate of development of resistance to chlorophos in granary weevils was studied. Weevils were collected from different areas (storage facilities, grain elevators and flourmills) and sprayed with chlorophos (trichlorfon). Resistance of natural populations was compared with resistance of laboratory populations not previously exposed to insecticides. It was found that the resistance index of weevils collected from elevators and mills was 17-62, compared with an index of 2-10 for weevils collected from storage facilities. The increased resistance to chlorophos was associated with repeated spraying of the facilities with this insecticide.

80-2019. Rotolo, V. S. (Dep. Cienc. Morfol., Fac. Cienc, Med., Sante Fe 3100, 2000 Rosaria, Argentina) **Reactividad linfocitaria *in vitro* y desarrollo tumoral *in vivo* en ratas tratadas con parathion. [Immune function and tumor development in parathion treated rats.]** *Medicina (Buenos Aires)* 39(5): 633-638; 1979 (17 references) (Spanish).

The effect of parathion (four doses of 20 μg/100 g body wt at 3-day intervals through gastric probe) on *in vitro* lymphocyte reactivity and *in vivo* tumor development was studied in female rats. Lymphocyte reactivity was determined from ^{3}H-thymidine incorporation. Thymidine incorporation was 2022 cpm on day 15, 1930 cpm on day

20, and 6907 cpm on day 30, versus 7457, 7940, and 7201 cpm in the untreated controls. The animals were injected sc 2×10^7 viable cells of sarcoma E_{100} on day 16. Tumor mortality was 75% in the parathion-treated animals, 40% in the untreated controls, and 42% in a control group treated with the vehicle of parathion (propylene glycol). The difference between the treated group and the controls was statistically significant ($p < 0.01$). It was concluded that parathion, given in low successive doses, favors the development of tumor grafts.

80-2020. Mulla, M. S.; Darwazeh, H. A.; Dhillon, M. S. (Dep. Entomol., Univ. California, Riverside CA 92521) **New pyrethroids as mosquito larvicides and their effects on nontarget organisms.** *Mosq. News* 40(1): 6-12; 1980 (7 references).

The toxicities of several synthetic pyrethroids [fenvalerate, Sumithrin (d-Phenothrin), decamethrin, and permethrin] to mosquitoes, mayfly naiads, dragonfly naiads, damselfly naiads, ostracods and diving beetle larvae were evaluated. Fenvalerate (10%; 0.025 and 0.050 lb/acre; 0.028 and 0.057 kg/ha) and Sumithrin (0.025 and 0.050 lb/acre) were toxic to mayfly naiads. Dragonfly naiads were affected by fenvalerate only (5% EC and 10%; 0.025 and 0.050 lb/acre). Diving beetle larvae and adults were suppressed for a short period by fenvalerate, and unaffected by the other compounds. Ostracods and damselfly naiads were not affected by any of the compounds studied.

80-2021. Kawachi, T.; Nagao, M.; Yahagi, T.; Takahashi, Y.; Sugimura, T.; Matsushima, T.; Kawakami, T.; Ishidate, M. (Natl. Cancer Cent. Res. Inst., Tokyo, Japan) **Our view on the relation between mutagens and carcinogens.** In: *Naturally Occurring Carcinogens-Mutagens and Modulators of Carconogenesis.* E. C. Miller, et al. eds. (Tokyo: Japan Sci. Soc. Press): pp. 337-344; 1979 (13 references).

The Ames *Salmonella* test has been found useful in detecting the mutagenic/carcinogenic potentials of over 700 compounds at the authors' laboratory in Tokyo. A modified Ames test was adopted to test for correlation between mutagenicity and carcinogenicity of several compounds including the pesticides captan and phenacetin. Such a short term quantitative approach is necessary to predict which compounds are likely to be carcinogenic when a great number of chemicals are to be screened. Other *in vitro* tests, the Ames *Salmonella* system, the Devoret's inductest, and chromosomal aberration tests in Chinese hamster cells gave similar results on the compounds tested in the presence modified Ames method. Long term *in vivo* carcinogenicity testing priorities should be based on the extent of exposure, the concentration of the compound and the necessity of its use instead of another noncarcinogenic compound.

80-2022. Ames, B. N. (Dep. Biochem., Univ. California, Berkeley, CA 94720) **The identification of chemicals in the environment causing mutations and cancer.** In: *Naturally Occurring Carcinogens-Mutagens and Modulators of Carcinogenesis.* E. C. Miller, et al, eds. (Tokyo: Japan Sci. Soc. Press): pp. 345-358; 1979 (56 references).

Research linking cancer, genetic birth defects, heart disease, aging, cataracts, and developmental birth defects to DNA damage caused by environmental mutagens is discussed. Mutagens may be naturally occurring agents or man-made products, such as the organochlorine pesticides which have been extensively used in the environment during the last few decades. Data on the increased production of ethylene dichloride since 1960 is given. Pesticide (DDE, DDT, dieldrin, heptachlor epoxide, oxychlordane, β-BHC and PCBs) residue levels found in human milk are also presented in tabular form. Human epidemiology and existing long term animal tests are suggested to be too time consuming, expensive, and inadequate for dealing with complex mixtures of chemicals. The identification of DNA mutagens by newly developed short-term tests is seen as a key tool for the rapid screening of thousands of man-made chemicals. Various short-term assay methods for mutagenicity are reviewed.

80-2023. Niedner, R.; Tacke, R.; Strecker, M. (Inst. Pharmakol. & Toxikol., Techn. Univ. Braunschweig, D-3300 Braunschweig, BRD) **The effect of silicon containing organophosphorus compounds and their protection against paraoxon.** *Naunyn-Schmiedebergs Arch. Pharmakol.* 311(SPPL): R28; 1980 (1 reference).

Some silicon containing organophosphoric esters (Si-PE) and their carbon analogs (C-PE) of the type $R^1R^2P(O)$ (p-OC_6H_4*E*Me_3) (*El* = C, Si) were synthesized, and their biological activities compared. Because of the (p-d) interactions between silicon and aryl groups the p-$OC_6H_4SiMe_3^-$ species should be a better leaving group for the phosphorylation of acetylcholinesterase (AChE) than the analog p-$OC_6H_4CMe_3^-$. Therefore, the Si-PEs should exhibit a greater anticholinesterase activity than the corresponding C-PEs. According to the method of Main and Dauterman the bimolecular reaction constants K_i were determined for the C-PE and Si-PEs. In agreement with the hypothetical concept mentioned above, the Si-PEs were found to inhibit the AChE 1.43-4.01 times more than the corresponding C-PEs, which have K_i values in the range of 4.28-36.39/*M*/min. After incubation of AChE with diethyl-*p*-trimethyl-silylphenylphosphate (10^{-7} *M*) for 20 min the enzyme was only slightly inhibited and showed an activity of 94.16% of normal. Paraoxon (10^{-7} *M*, 20 min) had an activity of 34.43%. Then the AChE was first incubated with Si-PE, and then with paraoxon (both 10^{-7} *M*, 20 min) the AChE-activity increased to 62.81%, demonstrating the protection of the enzyme against paraoxon by $(C_2H_5O)_2P(O)$(p-$OC_6H_4SiMe_3$). (Author abstract by permission)

80-2024. Rubenstein, A. E.; Ginsberg-Fellner, F.; Korczyn, A. D.; Witt, M. E.; Horowitz, S. H.; Mindel, J. S.; Frontera, A. T.; Lowe, Y. H. (Author address not given) **Chronic autonomic neuropathy due to rodenticide ingestion.** *Neurology* 30(4): 442; 1980.

Two cases are described of young women ingesting the rodenticide N-3-pyridylmethyl N′-p-nitrophenyl (Vacor) in suicide attempts. The patients developed insulin-dependent diabetes mellitus and peripheral sensorimotor neuropathy with prominent autonomic features within 2 and 10 days of ingestion. Symptoms included tonic pupils supersensitive to dilute pilicarpine, atonic esophagus, colon and bladder, and severe orthostatic hypotension (OH). In one patient, the sensory and motor dysfunctions gradually improved, but the dysautonomia persisted, and she was incapacitated by severe OH 2 yr later. It is noted that since Vacor was introduced in the United States in 1975, at least 12 cases of human ingestion resulting in severe autonomic dysfunction have been reported. Since animal studies indicate that early administration of niacinamide can prevent the toxic effects of Vacor, early recognition of the syndrome is critical. [Presented at the 32nd annual meeting.]

80-2025. Zelman, I. B.; Majdecki, T. (Neuropathol. Group., Cent. Exp. Med. & Clin., Polish Acad. Sci., PL-00784, Poland) **Zmiany ultrastrukturalne w mozgach szczurow po zatriciu fosforoorganiczym insektycydem dichlorsem (DDVP). [Ultrastructural changes in the rat brain following poisoning with the organophosphate insecticide dichlorvos (DDVP).]** *Neuropatol. Pol.* 17(3): 443-453; 1979 (14 references) (Polish).

Adult Wistar rats were treated with dichlorvos (80 mg/kg corresponding to 50% of LD50, po) for 10-21 consecutive days, and the changes occurring in the brain tissues were studied by electron microscopy. The most prominent changes concerned nerve cell processes, which showed focal loss of neurofilaments and neurotubules, and enlargement of the space between axoplasm and inner lamellae of myelin sheaths. The changes in the myelin were less marked and concerned almost exclusively the inner lamellae, causing complete destruction of myelin sheaths. There was no correlation between the intensity of the changes and the duration of the treatment.

80-2026. Tanoue, T.; Takano, R.; Kubota, T.; Ishihara, K.; Soeda, Y. (Nisso Inst. Life Sci., Nippon Soda Co. Ltd., Oiso, Kanagawa 255, Japan) **Balance study of ^{14}C-alloxydim-sodium in rat.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 315-322; 1979 (5 references).

[1,5-^{14}C] labeled alloxydim-sodium (ADS) and unlabeled ADS were combined and administered via intubation to rats at 70 mg/kg body wt/day for 7 days. At 2, 6, 12, and 24 hr and 3, 7, and 21 days after final dosing 2 rats were sacrificed for pathological and clinical examinations. Urine and feces were collected at 24 hr intervals and blood samples were obtained at 0 and 6 hr after the daily administrations. In single dosing experiments, rats were given 72 mg ADS/kg body wt. Urine and feces were collected at 2 and 6 hr and 1, 2, 3 and 4 days after administration. In repeatedly dosed rats total urine and feces radioactivity increased in males from 78.7% at 2 hr to 104.8% at 21 days and in females from 82.3% to 104.6% for the same period. In singly dosed rats total urine and feces radioactivity increased from 0.0% at 2 hr to 99.98% at 4 days. ADS residues in tissues were high in liver, stomach, intestines and bladder up to 6 hr after dosing but elimination from the organs was rapid. The ADS elimination rate was slowest from the blood; at 21 days ~10 ppm remained.

80-2027. Mitsumori, K.; Usui, T.; Takahashi, K.; Shirasu, Y. (Toxicol. Div., Inst. Environ. Toxicol., Kodaira, Tokyo 187, Japan) **Twenty-four month chronic toxicity studies of dichlorodiisopropyl ether in mice.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 4(3): 323-335; 1979 (23 references).

Dichlorodiisopropyl ether (DCIP; a nematicide) was given in the diet at 0, 80, 400, 2000 and 10,000 ppm to groups of 56 male and 56 female specific-pathogen-free (SPF) ICR mice for 104 wk. Body wt was determined once per wk for 0-26 wk, once every 2 wk for 27-52 wk and once every 4 wk for 53-104 wk. Seven males and females from each group at 13, 26 and 52 wk, 6 males and females from each group at 78 wk and all surviving animals at 104 wk were sacrificed for clinical and pathological examinations. Body wt gain was remarkably depressed in both sexes at the 10,000 ppm dose rate. Mild anemia and hemosiderin deposition as well as increased extramedullary hematopoesis of the spleen were observed at 13, 26 and 52 wk. In males, no changes attributable to DCIP were observed until dosed at the 2000 ppm level. In females, DCIP-related changes were observed at the 400 ppm level. No significant increases in the incidence of tumors or age-related lesions were noted in any of the groups.

80-2028. Kato, Y.; Sato, K.; Matano, O.; Goto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo 137, Japan) **Alkylation of cellular macromolecules by reactive metabolic intermediate of DBCP.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 45-53; 1980 (35 references).

In vitro studies using liver microsomal preparations from male Wistar Imamichi rats indicated that incorporation of DBCP was dependent on incubation time, the concentration of DBCP, enzymatically active microsomes, NADPH, and oxygen. Puromycin sufficient to inhibit protein synthesis did not affect incorporation of DBCP. Incorporation was prevented with SKF-525A, diethyldithiocarbamic acid, cysteine or glutathione. Oral administration of 20 mg/kg DBCP caused formulation of TCA- and organic-solvent unextractable macromolecular residues in rat tissue. It was concluded that DBCP was ox-

idatively metabolized to reactive metabolic intermediates by microsomal cytochrome P-450 and covalently bound with nucleophilic sites in cellular macromolecules *in vitro* and *in vivo*. It is suggested that the epoxide is one of the reactive metabolic intermediates responsible for protein alkylation by DBCP.

80-2029. Kato, T.; Shoami, M.; Kawase, Y. (Res. Dep., Pestic. Div., Sumitomo Chem. Co. Ltd., Takarazuka, Hyogo 665, Japan) **Comparison of tridemorph with buthiobate in antifungal mode of action.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 69-79; 1980 (28 references).

Tridemorph, at a concentration of 100 μM, caused inhibition of the incorporation of ^{14}C-U-glucose, ^{14}C-U-leucine and ^{14}C-U-uracil into the TCA-insoluble fractions of the mycelium of *Botrytis cinerea*. Evidence was present that suggests tridemorph disturbs the normal functions of the cellular membranes, possibly resulting in immediate cell death. Alteration of membrane permeability accounted for the inhibition of spore germination at 100 μM. A possible interference of tridemorph with sterol metabolism is also suggested. Tridemorph inhibited ergosterol synthesis at concentrations of 10 and 30 μM. The manner of interference by tridemorph with sterol metabolism differ from that of other agricultural fungicides.

80-2030. Kato, Y.; Sato, K.; Harada, T.; Maki, S.; Matano, O.; Goto, S. (Div. Chem., Inst. Environ. Toxicol., Kodaira, Tokyo 187, Japan) **Correlation between macromolecular binding of DBCP-metabolite and pathogenicity of necrosis.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 81-88; 1980 (22 references).

Male Wistar rats were given orally 20-400 mg/kg ^{14}C-DBCP (dibromochloropropane). Major locations of radioactivity were found in the liver and kidney. Pretreatment with phenobarbital potentiated DBCP-induced mortality, radioactive elimination into the urine, severity of necrosis, macromolecular binding, and depletion of glutathione in the liver and kidney with no effect on the non-bound radiocarbon content in these target organs. Pretreatment with SKF-525A reduced these indices with a slight increase of non-bound radioactivity in the kidney. Glutathione administration also reduced mortality and macromolecular binding. It is suggested that the macromolecular binding *in vivo* is caused by an activated metabolic intermediate formed on microsome. A protective role is postulated for glutathione against the incidence of necrosis. Glutathione is thought to inactivate the reactive metabolic intermediate of DBCP in target organs.

80-2031. Kurihara, N.; Yamakawa, K.; Fujita, T.; Nakajima, N. (Radioisotope Res. Cent., Kyoto Univ., Kyoto 606, Japan) **Anaerobic degradation of tetra-, penta-, and hexa-chlorocyclohexane isomers by rat liver microsomal P-450.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 93-100; 1980 (20 references).

Tetra-, penta- and hexachlorocyclohexane (BHC) isomers were effectively degraded by the microsomal fraction of rat liver in the presence of NADPH under anaerobic conditions. Major metabolites were 1,2,4-trichlorobenzene and 1,4-dichlorobenzene from hexachlorocyclohexenes and pentachlorocyclohexenes, respectively. The process therefore seemed to be reductive dechlorination followed by spontaneous dehydrochlorination. The results of the study indicate that P-450 is involved in the reaction. Electron transfer from NADPH and/or NADH via cytochrome P-450, then to the substrates binding to reduced cytochrome P-450, probably in its heme region, is suggested to occur in the reactions studied.

80-2032. Colliard, M.; Duprey, J.; Lepine, B.; Tcherdakoff, P. (Polyclin., Hop. Ambroise Pare, F-92100 Boulogne, France) **Troubles de l'acuite visuelle imputables a l'Op'DDD? [Visual acuity disturbances attributable to *o,p'*-DDD?]** *Nouv. Presse Med.* 9(9): 631-632; 1980 (4 references) (French).

A previously unreported side effect of the treatment of a patient suffering from Cushing's disease with *o,p'*-DDD (*o,p'*-TDE) is described. The patient developed a macular edema 4.5 mo following start of treatment with *o,p'*-DDD (1 to 10 g/day). The macular edema caused an impairment of vision of 0.4 in the right and 0.2 in the left eye. Vision returned and the edema disappeared after treatment was discontinued. It is concluded that there was a causative connection between the *o,p'*-DDD administration and the loss of vision in this case.

80-2033. Tompa, A. (Dep. Exp. Pathol., Natl. Inst. Work & Ind. Hyg., Budapest, Hungary) **Kemiai anyagok rakkelto hatasanak *in vitro* vizsgalo modszerei. [*In vitro* methods for studying the carcinogenic effects of chemical substances.]** *Orv. Hetil.* 121(10): 555-561; 1980 (48 references) (Hungarian).

In vitro tests for the identification of mutagenic and carcinogenic substances (environmental pollutants, occupational noxae, and drugs) are reviewed with special regard to Ames' test. Arsenic compounds were found to induce carcinomas of the skin, lungs and liver after inhalation, ingestion and skin contact. Folpet P proved to be a non-carcinogenic mutagens in Ames' test, while dieldrin and amitrol were found to be non-mutagenic carcinogens in the same test.

80-2034. Finkiewicz-Murawiejska, L. (Inst. Histol. & Embryol., PL-15089 Bialystok, Poland) **Obraz mor-**

foligiczny mozdzku szczurow bialych w warunkach podostrego zatrucia insektycydem fosforooganicznym - trichlorfonem. [Morphology of the cerebellum in white rats in subacute poisoning with trichlorfon, an organophosphorus insecticide.] *Patol Pol.* 30(3): 401-414; 1979 (27 references) (Polish).

The morphological changes caused by subacute poisoning with trichlorfon (100 or 250 mg/day intragastrically for 21 consecutive days) were studied in the cerebellum of male Wistar rats aged 4-5 mo. The animals were decapitated for the morphological examinations 1 or 9 days after administration of the last dose. The examinations revealed that trichlorfon is a markedly neurotoxic insecticide, damaging mainly the neuronal elements of the cerebellum. Small foci of demyelinization of the nerve fibers in the cerebellum were also observed. The intensity of the pathomorphological changes was not dose-dependent.

80-2035. Robinson, C. P. (Coll. Pharm., Univ. Oklahoma, Health Sci. Cent., Oklahoma City, OK 73190) **Effects of U-40481 and formetanate on the isolated rabbit central ear artery.** *Pestic. Biochem. Physiol.* 12(2): 109-116; 1979 (20 references).

Central ear arteries taken from New Zealand white rabbits were suspended in Ringer's solution in muscle chambers to be used in several different experiments with formamidine pesticides. Formetanate at 1.0 m*M* and U-40481 (an amitraz metabolite) at 0.1 m*M* gave maximal contractions of the artery muscles which could be antagonized by 1.0 μM and 3.0 μM of phentolamine, respectively. Maximal contractions produced by formetanate and U-40481 were found to be 22 ± 8% an 49 ± 6%, respectively of contractions caused by norepinephrine. Contract induced by norepinephrine, serotonin and histamine were reversibly antagonized by U-40481. This amitraz metabolite caused only slight antagonism of potassium-induced contractions. Neither formetanate or U-40481 affected the resting rate of radioactivity washout from tritiated norepinephrine preloaded strips. However, both compounds decreased electrically induced release which might trigger the local anesthetic-like actions observed in sympathetic neurones.

80-2036. Koch, R. B.; Patil, T. N.; Glick, B.; Stinson, R. S.; Lewis, E. A. (Dep. Biochem., Mississippi State Univ., Mississippi State, MS 39762) **Properties of an antibody to kelevan isolated by affinity chromatography: antibody reactivation of ATPase activities inhibited by pesticides.** *Pestic. Biochem. Physiol.* 12(2): 130-140; 1979 (27 references).

Chickens and rabbits injected with kelevan (ENT-27154) produced antibodies to the pesticide which were purified by affinity column. Antibody purity was checked by ultracentrifugation and gel electrophoresis. Free or immobilized antibodies were capable of preventing or reversing inhibition of ATPase activity by Kepone (chlordecone) in various tissues. Activity of mitochondrial Mg^{2+} ATPase which had been inhibited by 1 μM Kepone was restored by approximately 0.4 μM of purified antibody. Enzyme inhibition by DDT and aldrin were also effectively eliminated by 70 μg of purified antibody. However, restoration of enzyme inhibition by the antibody was much less effective with nonchlorinated acaricides such as cyhexatin and Kelthane (dicofol). These findings support the theory of an antibody binding site for the hapten which is specific for carbon-chlorine bond secondary or induced bonding forces.

80-2037. Mahmood, A.; Agarwal, N.; Sanyal, S.; Dudeja, P. K.; Subrahmanyam, D. (Dep. Gastroenterol., Postgrad. Inst. Med. Educ. & Res., Chandigarh 160012, India) **Alterations in the intestinal brush border membrane structure and function in chronic DDT-exposed monkeys.** *Pestic. Biochem. Physiol.* 12(2): 141-146; 1979 (26 references).

Male rhesus monkeys were used in studies to determine the effect of long-term DDT exposure on intestinal digestion and absorption functions, and on the chemical composition of the intestinal brush border membranes. Monkeys received DDT mixed with corn oil by stomach tube at a dose of 10 mg/kg body wt. Control animals received corn oil only. The animals were sacrificed after 100 days and the intestines quickly removed and everted. Intestinal uptake of sugar and amino acids was determined using a tissue accumulation method. Brush border membranes were isolated and homogenized, and enzyme assays were performed. DDT treatment led to increased intestinal uptake of D-glucose, L-leucine, and glycine, increased brush border sucrose and lactose activities, elevated cholesterol and triglyceride fractions of the brush border membrane, and reduced brush border sialic acid. There was no effect on brush border alkaline phosphatase, lactate dehydrogenase or Mg^{2+} ATPase activities. The results indicate that alteration in the brush border membrane structural organization may be responsible for observed changes in the functional activity of the enterocytes in DDT toxicity.

80-2038. Feroz, M.; Khan, M. A. Q. (Dep. Biol. Sci., Univ. Illinois Chicago Circle, Chicago, IL 60680) **Biotransformations of photoheptachlor in the rat. I. Excretion, storage, and isolation of metabolites.** *Pestic. Biochem. Physiol.* 12(2): 147-155; 1979 (10 references).

Male and female Charles River rats were injected ip with 0.92 mg/ml ^{14}C-photoheptachlor in corn oil, and urine and feces were collected and analyzed for radioactivity and for photoheptachlor metabolites by TLC and GLC. Male rats eliminated 66.3%, and female rats 28.1%, of the radioactivity in 4 wk. More radioactivity was found in the

feces than in the urine in both sexes. Female rats displayed higher levels of tissue residues of photoheptachlor than did male rats after 4 wk with the adipose tissue as the main storage site. Nine urinary and eleven fecal metabolites were isolated from the pesticide-treated rats. Purification and chromatographic characterization of these metabolites are described.

80-2039. Seiler, J. P. (Swiss Federal Res. Stn., CH-8820 Waedenswil, Switzerland) **Herbicidal phenylalkylureas as possible mutagens. II. Chemical basis of mutagenic activity.** *Pestic. Biochem. Physiol.* 12(2): 183-190; 1979 (15 references).

Possible reactivation mechanisms for the potential carcinogenic activity of urea herbicides were investigated using the 4-(*p*-nitrobenzyl)-pyridine (NBP) assay and a mouse testicular DNA synthesis inhibition test (DSI). During chemical synthesis of the proposed *N*-acetoxy compounds, alkylating action was observed on the NBP-assay. Neither the *N*-hydroxy- nor the unchanged parent ureas exhibited an alkylating action in this assay. DSI reactivity patterns of several positional isomers coincided with theoretical predictions as did the stability of chloroisomers in aqueous solutions of pH 7. In the Ames test, the *N*-acetoxy derivatives behaved as direct mutagens, while the parent compounds depended upon S-9 liver fraction for metabolic activation. Acetyl-CoA enhanced the S-9 mediated mutagenicity of the ureas, lending proof to the proposed reaction sequence *N*-oxidation-esterification-carbonium ion formation.

80-2040. Olson, K. L.; Boush, G. M.; Matsumura, F. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Pre- and postnatal exposure to dieldrin: persistent stimulatory and behavioral effects.** *Pestic. Biochem. Physiol.* 13(1): 20-33; 1980 (41 references).

The simultaneous effect of a malnutrition condition (low protein) and dieldrin exposure was investigated in 4 test groups of pregnant rats: control (20% protein); 20% protein + dieldrin; 10% protein; and 10% protein + dieldrin. Dieldrin was given in the diet beginning on day 5 of gestation. The animals received doses of about 0.35 μg/kg per day. A great difference in weight gain was noted between those animals receiving 10% and 20% protein diets. No difference was noted between those at 20% protein level with respect to concurrent dieldrin intake. Similar findings were apparent at the 10% protein level. No differences were noted between pesticide-treated and control diet groups with respect to righting reflex ability; those receiving the higher protein content diet were superior. Rats exposed to dieldrin demonstrated superior retention performance compared to controls. No major pathological changes were noted on histologic examination of the organs. There were a few abnormalities in the livers and kidneys, but no major changes.

80-2041. Bull, D. L.; Ivie, G. W. (Agric. Res., SEA, USDA, College Station, TX 77840) **Activity and fate of diflubenzuron and certain derivatives in the boll weevil.** *Pestic. Biochem. Physiol.* 13(1): 41-52; 1980 (11 references).

Diflubenzuron and 2 of its hydroxylated derivatives were applied topically or fed to adult female boll weevils. Other boll weevils were treated with methylated analogs of the 3 chemicals. The hatch of eggs from treated insects was inhibited by diflubenzuron and N-methyl diflubenzuron. Studies demonstrated that after the application of N-methyl diflubenzuron, diflubenzuron, 2-methoxy-N-methyl diflubenzuron or 3-methoxy-N-methyl diflubenzuron the chemicals were absorbed, metabolized and excreted at different rates. The chemicals were secreted into eggs at initial concentrations of 2.82, 2.24, 1.47 and 0.93 ppm, respectively. The concentrations diminished rapidly at 4 days post-treatment. It is suggested that the secretion of unmetabolized diflubenzuron into the eggs causes the inhibition in egg hatchability.

80-2042. Gammon, D. W. (Univ. Cambridge, Dep. Zool., Cambridge CB2 3EJ, England) **Pyrethroid resistance in a strain of *Spodoptera littoralis* is correlated with decreased sensitivity of the CNS *in vitro*.** *Pestic. Biochem. Physiol.* 13(1): 53-62; 1980 (23 references).

Isolated abdominal nerve cord of insecticide-resistant and insecticide-susceptible strains of *Spodoptera littoralis* larvae were exposed to permethrin at a concentration of 10^{-7} *M*. This treatment caused a prolonged spike train to follow electrical stimulation of the nerve cord. Cypermethrin did not cause such repetitive discharges in the resistant strain. In studies of nerve blockage, permethrin caused quicker nerve blockage under conditions of reduced temperature. Nerve blocking action of cypermethrin was not affected by changes in temperature. When dodecyl imidazole was introduced into the experimental set up, it was found that this synergist did not significantly reduce the time taken for permethrin to cause either repetitive firing or nerve blockage. Reduction of the calcium concentration in the saline did significantly reduce the latency of repetitive firing caused by permethrin in the resistant larvae.

80-2043. Esaac, E. G.; Matsumura, F. (Cyanamide Agric. Res. Stn., Alexandria, Egypt) **Mechanisms of reductive dechlorination of DDT by rat liver microsomes.** *Pestic. Biochem. Physiol.* 13(1): 81-93; 1980 (27 references).

Rat liver microsomal suspensions were incubated anaerobically and in the dark with flavin cofactors, nicotinamide cofactors and DDT (70 nmol) at 37°C for 2 hr. *In vitro* incubation mixtures and liver microsomes for rats treated ip with microsomal enzyme inducing agents were also studied. DDT was dechlorinated to TDE under anaerobic conditions in the presence of either riboflavin

cofactors or NADPH. FAD and NADPH significantly increased DDT reduction over that caused by either cofactor alone. Changes in pH (from 5 to 8) had no effect on the rate of dechlorination when both FAD and NADPH were present. In the presence of FAD alone, increased pH brought about increased DDT reduction. Incubation time and amount of microsomal protein increased DDT dechlorination linearly at first and then slowed down. Sesamex and piperonyl butoxide had neither inhibitory or stimulatory effects on DDT reduction. In rats treated with enzyme inducing agents, piperonyl butoxide (PB) pretreatment caused a 63% increase in dechlorination, and methylcholanthrene (3MC) decreased conversion to TDE in NADPH dependent microsomes. PB caused a decrease and 3MC had no effect in the FAD system. A mechanism for the involvement of the mixed function oxygenase system in carrying out reductive dechlorination is proposed.

80-2044. Juchau, M. R. (Dep. Pharmacol., Univ. Washington Sch. Med., Seattle WA 98195) **Drug biotransformation in the placenta.** *Pharmacol. Ther. Part A* 8(3): 501-524; 1980 (40 references).

There has been little research on the metabolism of drugs by the placenta. Compared with the liver, the placenta has only limited ability for the biotransformation of foreign organic molecules. However, nearly all of the common drug metabolic pathways have been shown to take place in placental tissue. Limited biotransformation in the placenta appears to be due to the quantity of enzymes plus the actual enzymes present. The insecticide chlordane has been reported to increase rates of hexobarbital and zoxazolamine oxidation in rabbit placentas. However, it is concluded that human or animal exposure to phenobarbital or phenobarbital-type inducing agents (chlordane) would effect placental xenobiotic oxidizing systems minimally or not at all. It is suggested that placental metabolism provides an ineffective barrier for most toxic chemicals. It is concluded that further study of the placenta as a possible converter of organic promutagens and procarcinogens to their active forms is necessary.

80-2045. Los Reyes, M. d.; Mora, E. C. (Copiah-Lincoln Jr. Coll., Wesson, MS 39191) **Tissue residues and ultrastructural changes induced by DDT in chickens.** *Poult. Sci.* 58(5): 1183-1191; 1979 (18 references).

Chickens were given DDT in an oral dose of 100 mg/kg body wt 3 times a day for 10 days. Specimens of liver, pancreas, heart, skeletal muscle, brain, and sciatic nerve were obtained from morbid chicks for analysis of residue levels of DDT and metabolites, DDD (TDE) and DDE, and for electron microscopic examination. Fat and sciatic nerve tissue contained the largest amount of DDT and metabolite residues, and skeletal muscle and brain tissue contained the smallest amount of residues. Only moderate amounts of detectable residues were present in the liver, pancreas, and heart muscle. The liver cells underwent more changes than any other organ and exhibited alterations in individual parenchymal cells as well as areas of tissue disorganization. Proliferation of bile duct epithelia and smooth endoplasmic reticulum was found. Disorganization of pancreatic endoplasmic reticulum and a decrease of zymogen granules were found. Displacement of sarcotubules and banding pattern in myocardium occurred. Alterations of the myelin sheath, increased amount of vesicles, and absence in some areas of the nucleated sheath of Schwann were the major changes observed in the sciatic nerve. (Author abstract by permission)

80-2046. Hunt, L. M.; Gilbert, B. N.; Lemeilleur, C. A. (US Livest. Insects Lab., Agric. Res., SEA, USDA, Kerrville, TX 78038) **Distribution and depletion of radioactivity in hens treated dermally with ^{14}C-labeled permethrin.** *Poult. Sci.* 58(5): 1197-1201; 1979 (5 references).

The 25:75 *cis:trans* mixture of permethrin (BW21Z), a broad spectrum pyrethroid insecticide, was labeled with ^{14}C in the alcohol: methylene: carbon moiety and mist sprayed at 2 rates (3.77 or 11.94 mg/hen) on 28 hens. Peak permethrin equivalents in both treatment groups were found in the skins, 0.414 and 6.69 ppm, respectively. Total permethrin equivalents peaked 3 days after treatment, but permethrin equivalents in eggs peaked 5 days after treatment. (Author abstract by permission)

80-2047. Kale, R. D.; Krishnamoorthy, R. V. (Dep. Zool., Univ. Agric. Sci., Bangalore 560065, India) **Pesticidal effects of Sevin (1-naphthyl-*n*-methyl carbamate) on the survivability and abundance of earthworm *Pontoscolex corethrurus*.** *Proc. Indian Acad. Sci. Sect. B* 88(6PT1): 391-396; 1979 (24 references).

The effects of the carbamate insecticide Sevin (carbaryl) on the survival, activity, and fecundity of the earthworm *Pontoscolex corethrusus* were investigated. Worms were introduced into glass jars filled with sand and clay loam soil containing 0.400 ppm Sevin, and left undisturbed for 30 days. At the end of the experimental period, the worms were counted and weighed, the weight of worm casts, as a measure of activity, and the number of hatched cocoons were determined. There was a significant linear reduction in the survivability of the worms with increasing Sevin concentrations, with 50% survivability observed at 375 ppm Sevin. The worms were found to lose weight curvilinearly with respect to increasing Sevin concentration, with a slight weight improving effect at concentrations up to 150 ppm, and a steady and steep loss of weight at higher concentrations. Cast output increased by 67% at 50 ppm, but decreased exponentially at concentrations over 50 ppm. Concentrations of 37.5 and 75.0 ppm increased cocoon laying by three-fold from those of controls, but no cocoons were determined at higher concentrations. The data suggest that up to a level of 100 ppm

Sevin favors the life activities of the earthworm, but above this level there is an adverse effect on the population.

80-2048. Greichus, Y. A.; Dohman, B. A.; Hillam, R. P. (Dep. Chem., South Dakota State Univ., Brookings, SD 57007) **Diagnosis and pathologic effects of pentachlorophenol toxicosis in young pigs.** *Proc. N. D. Acad. Sci.* 33: 10; 1979.

Six-wk-old pigs were used in a study to determine the pathologic effects of pentachlorophenol (PCP). Pigs were treated with 0, 5, 10 or 15 mg/kg/day of purified PCP in capsule form for 30 days. PCP levels in blood, kidneys and liver of the 3 treatment groups were not significantly different from each other, but were considerably higher than controls. In addition, liver weight and blood urea nitrogen increased and white blood cells decreased significantly in treated groups as compared with controls. Gamma globulin levels in the controls increased while those in the treated groups did not. The results indicate the possibility of PCP causing damage to kidney and liver, and PCP-induced weakening of the immune system.

80-2049. Skiftun, R. M.; Puyear, R. L. (Zool. Dep., North Dakota State Univ., Fargo, ND 58105) **Possible role of sympathetic nervous system in regulation of ascorbic acid production in the rat.** *Proc. N. D. Acad. Sci.* 33: 47; 1979 (1 reference).

The role the sympathetic innervation of the liver plays in increasing urinary ascorbic acid levels by certain pharmacologic agents was studied. Nine male Holzmann rats were injected ip with 50 mg 6-hydroxy dopamine/kg to effect selective chemical sympathectomy of the liver. Another group of 9 rats were sham-operated. Three rats from each group were fed normal ground chow, or ground chow treated with 500 ppm *o,p'*-DDT or 1000 ppm barbitol. Urine was collected every 24 hr for 7 days and analyzed for ascorbic acid. Liver glycogen was measured on day 7. Both sympathectomized and sham-operated rats, given *o,p'*-DDT, showed elevated urinary ascorbic acid levels, but the increase was significantly lower in the sympathectomized rats. Urinary ascorbic acid levels were increased in the barbitol treated rats but the increase was less than in *o,p'*-DDT treated rats. Liver glycogen was decreased by sympathectomy and *o,p'*-DDT, and barbitol caused further reductions. Sympathetic stimulation of the liver by *o,p'*-DDT is suggested to be a cause of increased urinary ascorbic acid levels.

80-2050. Chambers, J. (Slough Lab., Minist. Agric. Fish. & Food, Slough, Berks SL3 7HJ, England) **An introduction to the metabolism of pyrethroids.** *Residue Rev.* 73: 101-124; 1980 (50 references).

Early work suggested that a variety of insect species metabolize pyrethrins, the natural esters, by initial ester cleavage. Subsequently it was shown that with houseflies ester cleavage is unimportant and the metabolism of pyrethrin I and the closely related synthetic pyrethroid (+) *trans*-allethrin involves successive oxidation of mainly the *trans*-methyl group of the isobutenyl moiety of the acid side. Investigations with mammals suggested that in rats the metabolic emphasis is essentially similar to that in houseflies but in addition oxidation at various sites on the alcohol side is occasionally observed. Work on tetramethrin, a synthetic pyrethroid based on a primary alcohol, in both living houseflies and rats showed that the initial degradation is by ester cleavage, and that this is probably due to the action of esterases rather than being an example of oxidative de-esterification. The metabolism of resmethrin has been studied in great detail. Kinetic studies on the separate component isomers were able to account for differences in selective toxicity between insects and mammals. An important conclusion was that pyrethroid-hydroxlyzing esterases probably contribute to the low mammalian toxicity of (+)*trans*-chrysanthemates of primary alcohols. Qualitative differences between the metabolic pathways of the 4 isomers were also demonstrated, for example, the *trans*-isomers undergo rapid ester cleavage whereas the *cis*-isomers suffer initial oxidative attack. Phenothrin is another pyrethroid based on a primary alcohol. Although not studied so closely it would appear that its metabolism by mammals closely parallels that of resmethrin. In the photostable pyrethroid permethrin a dichlorovinyl group replaces the isobutenyl moiety of the acid side (a site of potential oxidative degradation). This structural modification does not seem to affect the ease of detoxification in mammals. Again metabolism in both insects and mammals involves ester cleavage and oxidation of the acid and alcohol produced. (Author abstract by permission)

80-2051. Pollack, J. D. (Ohio State Univ., Columbus, OH) **Models of chemical and virus interaction and their relation to a multiple etiology of Reye's syndrome.** In: *Reye's Syndrome II.* Crocker, J. F. S., ed. (Grune & Stratton: NY): pp. 341-360; 1979 (38 references).

The synergistic effects of viruses and chemicals leading to potentiation of cellular pathology, and their possible relationship in the etiology of Reye's syndrome, are reviewed. Several workers have shown that insect mortality by insecticides is dramatically increased after viral exposure. Host insect species exposed to polyhedrosis virus were more susceptible to the toxic effects of TEPP, toxaphene, parathion, endrin, endosulfan, or trichlorfon, than to either viral or chemical exposure alone. Viral-chemical interactions have also been demonstrated in tissue culture experiments. HeLa cells treated with Karathane (dinocap; a dinitrophenyl insecticide) and poliovirus resulted in a virus yield per cell of 18 times more than in cells not exposed to the pesticide. Duck hepatitis potentiation by DDT and dieldrin in mallards, and encephalomyo-

carditis viral enhancement by fenitrothion and petroleum byproduct in rodents have also been noted. An experimental working hypothesis for the multiple etiology of Reye's syndrome involves 3 possible initiators: a virus, an exogenous toxin, or a virus-toxin interaction. Exogenous toxins such as aflatoxins, insecticides, herbicides, or surfactants may affect normal structure or metabolism of cellular organelles leading to Reye's syndrome.

80-2052. Ruben, F. L. (Infect. Disease Unit, Montefiore Hosp., Pittsburgh, PA) **Recent developments and contributions from experimental models of Reye's syndrome.** In: *Reye's Syndrome II.* Crocker, J. F. S., ed. (Grune & Stratton: NY): pp. 385-397; 1979 (15 references).

The role of influenza virus infection and chemical exposure producing Reye's syndrome (RS) were investigated. Three-wk-old Syrian hamsters of both sexes were exposed to either the herbicides Esteron (2,4-D and 2,4,5-T), Amdon 101 (picloram) and Daconate 6 (MSMA); the insecticides Sevin 4 oil (carbaryl), Dylox 4 (trichlorfon) and malathion; or to solvents and emulsifiers widely used as vehicles for spray pesticides. The chemicals, diluted 1:100 in corn oil, were brushed on the animals' backs for 10 days prior to administration of influenza A/Eng/74 or influenza B/HK/74 viruses (from patients with known cases of RS) intranasally. Serum biochemical studies showed that toxin alone, and viral-toxin animals, did not significantly differ from controls in levels of cholinesterase, alkaline phosphatase, SGOT, or SGPT. There were appreciable differences for mean triglyceride (TG) levels between control, virus-alone, and toxin-only groups. Influenza B plus herbicide groups showed increased TG levels (239-283 mg/dl), as did virus-insecticide (198-246 mg/dl), virus-emulsifier (234-346 mg/dl), and insecticide-alone (239-282 mg/dl), emulsifier-alone (241-414 mg/dl), and herbicide alone (238-296 mg/dl) groups when compared with corn oil-only controls (200 mg/dl). Synergistic effects of toxins and viruses were not demonstrated.

80-2053. Loria, R. M.; Madge, G. E. (Author address not given) **Virus lipid interaction and Reye's syndrome.** In: *Reye's Syndrome II.* Crocker, J. F. S., ed. (Grune & Stratton: NY): pp. 399-409; 1979 (26 references).

A hypothesis for a common mechanism of action of different viral agents with lipids that may be involved in Reye's syndrome is presented. Male CD-1 and C57BL/6J mice were grouped as Coxsackievirus-infected, normal animals; hyperlipemic, non-infected animals; hyperlipemic, virus-infected animals; and normal, non-infected controls. Severe fatty metamorphosis of almost all hepatic cells with cellular necrosis and conspicuously absent inflammatory infiltrate was observed in virus-infected hypercholesteremic mice. Virus infection of hyperlipemic mice resulted in greater susceptibility and fatality. It was also observed that hyperlipemia may also suppress the host immune response and thus lead to increased susceptibility to infections. It is proposed that since environmental substances implicated in initiation of Reye's syndrome (pesticides and emulsifiers) cause either liver injury or fatty changes, these agents lead to a greater susceptibility to infection by viral agents. This synergistic, virus-lipid interaction could then result in aggravated and divergent pathology. The inability to cope with this aggravated condition is suggested to lead to a Reye's syndrome like disease.

80-2054. Rozee, K. R.; Laltoo, M.; Lee, S. H. S.; Crocker, J. F. S.; Safe, S. (Dep. Microbiol., Dalhousie Univ., Halifax, Nova Scotia, Canada) **Emulsifiers as enhancement factors in virus virulence.** In: *Reye's Syndrome II.*Crocker, J. F. S., ed. (Grune & Stratton: NY): pp. 443-457; 1979 (5 references).

The synergistic effects of pesticidal emulsifying agents and encephalomyocarditis (EMC) virus infections in mammalian cells were investigated. Fenitrothion and its emulsifiers (Toximul MP 8, Atlox 3409, Marlophen 810, Polytergent FL 62, Brij 56, Toximul D, and Toximul R) were used in combinations of EMC, vesicular stomatitis virus (VSV), and Herpes- and Reo- viruses. Experiments with mouse L-929, primary human kidney (HK), monkey kidney (VERO), and HeLa cells showed that all of the cells were rendered more susceptible to VSV replication by 0.25-10.0 ppm concentrations of Toximul MP8. Exposure of L-929 cells to 10 ppm Toximul MP8 followed by viral infection resulted in replication enhancement index ratios of 4.37, 3.38, 1.72, 1.04, and 1.04 for VSV, EMC, Poilo 1, Herpes 1, and Reo 2 viruses, respectively. Other emulsifiers were also shown to enhance viral replication.

80-2055. Mlynarczyk, W. (Dep. Toxicol., Inst. Bioanal., Poznan, Poland) **Zmiany ilosciowe tryozyny w eksperymentalnych zatruciach Ferbamem 76. Cz. III. Kinetyka wydalania wolnej tryozyny z moczem zwierzat doswiadczalnych. [Quantitative changes of tyrosine in experimental poisoning with Ferbam 76. Part III. Kinetics of urinary excretion of free tyrosine in experimental animals.]** *Rocz. Panstw. Zakl. Hig.* 30(6): 585-589; 1979 (5 references) (Polish).

The urinary excretion of free tyrosine was studied in albino rats treated with single doses of 80, 160, and 400 mg Ferbam 76 (containing 76% *N,N*-dimethyldithiocarbamate). The free tyrosine excretion dropped linearly after administration of 80 and 160 mg doses, reaching 0.02 mg/ml in less than 5 days after treatment with 80 mg, and in slightly more than 6 days after treatment with 160 mg. The decrease was very slight in the group treated with 400 mg; tyrosine excretion remained only slightly below 0.4 mg/ml on day 6. The slight decrease in the group treated with 400 mg is attributed to renal dysfunction.

80-2056. Krolikowska-Prasal, I.; Niespodziewanska, H.; Kosut-Chmielewska, G. (Dep. Histol. & Embryol., Acad. Med., Lublin, Poland) **Badania wplywu Ambuszu na odczyny histochemiczne w jelicie cienkim zwierzat doswiadczalnych. [Investigations on the effect of Ambusz on the histochemical reactions in the small intestine of experimental animals.]** *Rocz. Panstw. Zakl. Hig.* 30(6): 591-598; 1979 (Polish).

The effects of Ambusz (Ambush; permethrin) on the histochemical reactions of the small intestine were studied in 250 g albino rats. The animals were treated ig with 1 ml of 0.1% or 0.2% solutions daily for 7 consecutive days. Alkaline phosphatase activity was reduced in the brush border cells of the intestinal epithelium. The number of lysosomes in the enterocytes increased. Disturbances in mucus secretion leading to degeneration of mucocytes and reductions in RNA activity in the cytoplasm of epithelial cells were also observed.

80-2057. Goodman, L. R.; Hansen, D. J.; Coppage, D. L.; Moore, J. C.; Matthews, E. (Environ. Res. Lab., US EPA, Gulf Breeze, FL 32561) **Diazinon: chronic toxicity to, and brain acetylcholinesterase inhibition in, the sheepshead minnow, *Cyprinodon variegatus*.** *Trans. Am. Fish. Soc.* 108(5): 479-488; 1979 (29 references).

Sheepshead minnows (*Cyprinodon variegatus*) were exposed to diazinon in continuous flow-through toxicity tests. At levels of 1400 μg/l diazinon was lethal to 50% of the juvenile fish in the 96-hr acute toxicity test. Diazinon at 0.47, 0.98, 1.8, 3.5, and 6.5 μg had no effect on parental survival, egg fertility or survival and growth of progeny. However, the number of eggs spawned were significantly reduced at all concentration levels. No dose dependence was found between reduction in number of eggs spawned and diazinon levels of the water. Fish exposed to 3.5 μg/l followed by depuration for 23 to 31 days showed no improvement in the number of eggs spawned even though their tissues contained no detectable residues of diazinon and their brain AChE activity appeared normal. Fish AChE activity was seen to decrease with exposure to increasingly higher levels of diazinon. Tissue residues of diazinon varied greatly, but overall the insecticide was found to bioaccumulate in the fish. Maximum acceptable toxicant concentrations for *C. varegatus* exposed continuously to diazinon was estimated to be less than 0.47 μg/l.

80-2058. Komarova, L. I.; Gorbachevskaia, E. F. (All-Union Res. Inst. Hyg. & Toxicol. Pestic. Polymers & Plastics, Kiev, USSR) **Morfologicheskie i tsitokhimicheskie issledovaniia kletok krovi i krovetvornykh organov pro khronicheskom vozdeistvii khlororganicheskikh pestitisidov. [Morphological and cytochemical studies of blood cells and hemopoietic organs during chronic exposure to organochlorine pesticides.]** *Tsitol. Genet.* 13(4): 272-275; 1979 (Russian).

The effect of organochlorine pesticides on immunological reactivity was studied in rabbits. Animals were divided into three groups: 20 rabbits in group 1 were kept for 3 mo on a ration containing DDT (10 mg/kg), 20 rabbits in group 2 were kept for 3 mo on a ration containing γ-HCCH (γ-BHC; lindane; 4 mg/kg), and 8 rabbits in group 3 served as control. DDT and γ-HCCH induced similar morphological changes in the lymphopoietic organs: hyperplasia of reticulocytes in the spleen and bone marrow, predominance of immature lymphocytes and leukocytes, and increased count of plasmacytes. Cytochemical examination showed that prolonged exposure to DDT and γ-HCCH resulted in a significant decrease of activity of alkaline phosphatase (1.38 and 1.24 IU, respectively, compared with 1.84 IU in controls) and nonspecific esterase (1.84 and 1.54 IU, respectively, compared with 2.02 IU in controls) in peripheral blood granulocytes.

80-2059. Angelo-Nielsen, K.; Christensen, J. B.; Jarbol, H. (Vestergrade 11, DK-5800 Nyborg, Denmark) **Parationforgiftning. Atropinbehandling. [Parathion poisoning. Atropine therapy.]** *Ugeskr. Laeg.* 142(10): 646-647; 1980 (5 references) (Danish).

A 37-yr-old man was hospitalized after drinking about half a glass of parathion 35. Atropine treatment was started immediately (2 mg iv) along with pralidoxime (iv) and granulated charcoal (po). The patient developed coma, cyanosis, generalized muscular spasms, emesis, bradycardia, and hypertension. Respirator treatment was necessary for 38 days. Cardiac arrythmia and ventricular fibrillation developed during the first few days. Atropine was given to keep the pulse rate at 120/min. The total atropine dose given in 25 days was 4454 mg, with a highest daily dose of 534 mg. The patient was transferred to another ward after 7 wk. He was in good condition and occupationally rehabilitated 2.5 yr after the poisoning.

80-2060. Birge, W. J.; Black, J. A.; Bruser, D. M. (Thomas Hunt Morgan Sch. Biol. Sci., Lexington, MA) **Toxicity of organic chemicals to embryo-larval stages of fish.** *US NTIS PB Rep.* PB-101,637 72 pp.; 1979 (54 references).

A continuous flow procedure was developed for evaluating effects of insoluble and volatile organics on embryo-larval stages of fish. Test compounds were selected for different combinations of solubility and volatility, and included aniline, atrazine, chlorobenzene, chloroform, 2,4-D, 2,4-dichlorophenol, dioctyl phthalate, malathion, trisodium nitrilotriacetic acid, phenol, and PCB (Capacitor 21). A closed system devoid of standing air space greatly reduced volatility as a test variable. Mechanical homogenization proved highly effective in suspending hydrophobic compounds in influent water. Continuous agitation in the test chamber and regulation of detention

time further precluded the need for carrier solvents. The most toxic compounds included Capacitor 21, chlorobenzene, 2,4-dichlorophenol, and phenol. Compared to other species, trout developmental stages generally exhibited the greatest sensitivity. The LC1 values determined in embryo-larval tests compared closely with maximum acceptable toxicant concentrations developed in life-cycle studies. Most compounds produced appreciable frequencies of teratic larvae. (Author abstract by permission, abridged)

80-2061. Sidell, N.; RamaRao, G. V.; Tompkins, W. A. F.; Hansen, L. G.* (Dep. Vet. Anat. Physiol. & Pharmacol., Univ. Illinois, Urbana, IL 61801) **Phagocytic and Fc receptor functions of alveolar macrophages in cats following ingestion of hexachlorobenzene.** *Vet. Human Toxicol.* 21(4): 254-257; 1979 (17 references).

Studies were performed to determine the effects of hexachlorobenzene (HCB) on the phagocytic and crystallizable fraction receptor functions of alveolar macrophages in cats. Pork with HCB concentrations of 0.09 ppm (control), 90 ppm (low dose), and 263 ppm (high dose) was fed to 3 groups of cats each containing 6 proven queens. After 142 days, during which time the queens were bred, queened and nursed their litters for 42 days, the cats were killed. The macrophages were washed from the right lungs immediately and cultured for antibody testing. The left lung was prepared for histological examination. High dose cats were less robust and suffered from respiratory infections. Histological examination showed no differences in treatment and control animals. HCB was, however, high in the lungs of the treatment group. There were no differences in the occurrences of macrophages, nor in the phagocytic activity in the control and treatment groups. The EA-rosette forming ability of cats fed HCB was less than for the controls. The high-dose group forming ability was less than that of the low-dose group. It is suggested that the chronic ingestion of HCB results in increased respiratory infection, probably as a result of impaired macrophage function.

80-2062. Mcanalley, B. H.; Gardiner, T. H. (Dep. Pharmacol., Health Sci. Cent., Univ. Texas, Dallas, TX) **Pulmonary toxicity of α-naphthylthiourea (ANTU).** *Vet. Human Toxicol.* 21(5): 387; 1979.

Rats received injections of 5 mg/kg α-naphthylthiourea (ANTU). During the onset of lung edema which followed this injection, the clearance of excess extravascular water greatly exceeded the clearance of edema fluid protein, and plasma proteins were sieved by structures downstream from the capillary endothelium in edematous lungs. Fibrin was found in interstitial spaces. This could account both for the increased extravascular protein and for the selective sieving of large proteins common in chemical-induced lung edema.

80-2063. Evdokimov, E. S.; Kurbanov, E. A.; Bairamov, M.; Orakaeva, N. S. (Turkmenian Res. Inst. Anim. Husb. & Vet. Sci., USSR) **Fagotsitarnaia aktivnost' i shchelochnaia fosfataza pri otravlenii zhivotnykh pestitsidami. [Phagocytic activity and alkaline phosphatase during pesticide poisoning in animals.]** *Veterinariya (Moscow)* (2): 57-58; 1980 (Russian).

To evaluate the effect of organochlorine pesticides on phagocytic activity of leukocytes, 1-1.5-yr-old calves received for 3.5 mo fodder containing 12% dust of HCCH (BHC; 48 mg/kg, AI) or 10% dust of DDT (40 mg/kg, AI). Indices of phagocytosis were determined during exposure, and 1.5 and 4.5 mo after termination of poisoning. Chronic exposure to pesticides resulted in marked inhibition of phagocytosis; the most pronounced changes were recorded in cattle exposed to DDT (6.2-fold decrease of phagocytic index and 3.1-fold decrease of phagocytic activity). Normalization of indices of phagocytosis was observed only 4.5 mo after termination of exposure. During the 1st month of poisoning, activity of alkaline phosphatase in neutrophils ranged from 14 to 94 IU (compared with 51-60 IU in control animals). The decrease of activity of alkaline phosphatase was associated with general deterioration of clinical state.

80-2064. Bogdan, A. S.; Patent, R. L.; Dubenetskaia, M. M. (Dep. Toxicol., Byelorussian Res. Sanit. Hyg. Inst., Minsk, USSR) **Obespechennost' tiaminom zhivotnykh, poluchavshikhzerno rzhi i pshenitsy, vyrashchennykh s primeneniem gerbitsidov gruppy khlorproizvodnykh fenoksikislot. [Thiamine supply in animals fed with grain of rye and wheat treated with herbicides from a group of choroderivatives of phenoxyacids.]** *Vopr. Pitan.* (1): 61-64; 1980 (6 references) (Russian).

Analysis of the grain of rye and wheat grown with the use of the amine salt of 2,4-D (1 kg/ha) and Dialen (0.9 kg/ha) showed decreased thiamine levels. Feeding of rats with this grain resulted in significant decrease of thiamine level in the liver, with a corresponding increase of the level of pyruvic acid in the urine.

80-2065. Shamrai, P. F.; Prishchak, A. F. (Dep. Hist. Med. Inst., Vinnitsa, USSR) **Vliianie nekotorykh pestitsidov na zazhivlenie posleoperatsionnykh ran. [Effect of some pesticides on healing of postoperative wounds.]** *Vrach. Delo* (12): 92-95; 1979 (Russian).

The results of clinical and experimental evaluation of the effect of pesticides on the healing of postoperative wounds are reported. Analysis of the results of osseosynthesis for fracture of tubular bones in 50 patients who had an occupational exposure to pesticides polychloropinene (PCP), methylmercaptophos (MMP; demeton-O-methyl), and tetramethylthiuramdisulfide (TMTD; thiram) showed that the healing of postoperative wounds was by 3-4 days longer than the healing in a control group of 51 patients

who had not been exposured to pesticides. To evaluate the possible mechanism of delayed healing, random-bred albino rats were exposed to PCP, MMP, TMTD, or their mixtures for 6 mo; then wounds were afflicted. It was found that exposure to pesticides at 0.1 LD50 inhibited the growth of granulation tissue and induced foci of necrosis, edema, hemorrhage, and plasmocytic infiltration.

80-2066. Serns, S. L. (Dep. Nat. Res., Woodruff, WI 54568) **Effects of Pro-Noxfish on the benthos and zooplankton of Bug Lake, Forest County, Wisconsin.** *Water Resour. Bull.* 15(5): 1385-1393; 1979 (22 references).

Bug Lake was treated with 2.5 mg/l Pro-Noxfish (0.063 mg/l rotenone and 0.063 mg/l sulfoxide synergist) on November 17, 1975. *Chironomus* and some zooplankton immediately gave signs of intoxication. For some zooplankton, such as *Daphnia* sp. and calanoids, the spring pulse was delayed in 1976 until after detoxification of rotenone was complete in mid-May. A significant decrease in the mean number of trichopterans was noted at the 3 m contour after treatment with Pro-Noxfish. Each major zooplankton taxa encountered before treatment was found after treatment, and at some time thereafter their density surpassed the highest density recorded prior to this initial application.

80-2067. Kann, V.; Buergermeister, W.; Wawschinek, O. (Med. Abt., Landeskrankenhauses Wagna Leibnitz, Graz, Austria) **Standardisierte forcierte Diurese und Peritonealdialyse in der Behandlung einer Alkylphosphatvergiftung. [Standardized forced diuresis and peritoneal dialysis in the therapy of organophosphorus poisoning.]** *Wien. Med. Wochenschr.* 129(23): 667-669; 1979 (11 references) (German).

A 29-yr-old man was hospitalized in a comatose state after suicidal poisoning with methidathion. The ingested dose was 250-400 ml Ultrasid 20 (AI methidathion), which was estimated to be 12 times the lethal dose. Atropine (10 mg iv) was administered immediately, followed by gastric lavage, enema, standardized forced diuresis (for 96 hr, total infusion volume 109 *l*), and peritoneal dialysis (total volume 72 *l*). Continuous atropine treatment was instituted; the total dose administered during the first wk was 700 mg iv. Extubation was possible after 24 hr. The patient was transferred from the intensive-care unit in ambulant condition on day 6. Serum cholinesterase activity rose from an initial value of 230 U/l to 2100 U/l on day 16. The course of the illness and the duration of the acute phase were significantly shorter than in comparable cases. No hazardous situation occurred after the first hr of treatment. Methidathion and its metabolites were detected in the urine and dialysate by thin-layer chromatography.

80-2068. Herman, S. G.; Bulger, J. B. (Evergreen State Coll., Olympia, WA 98505) **Effects of a forest application of DDT on nontarget organisms.** *Wildl. Monogr.* 69; 6-62; 1979 (50 references).

Aerial spraying of DDT was permitted over 172,620 ha of coniferous forest in eastern Oregon, eastern Washington, and northern Idaho in 1974 to control the tussock moth in its larval stage. Studies of the area following the spraying through 1976 indicate that the DDT sprayed impacted areas far beyond the target range. It is suggested that DDT appearing in New York rainwater in August through November 1974 originated in the northwestern US. The findings of the effects of DDT on aquatic insects, arboreal insects, density of breeding birds, bird mortality and reproductive success, and residues of DDT in vertebrates are reported. Effects on small mammals are also discussed.

80-2069. Koschier, F. J.; Pritchard, J. B. (Food & Drug Res. Lab., Waverly, NY 14892) **Renal handling of 2,4,-D by the dogfish shark (*Squalus acanthias*).** *Xenobiotica* 10(1): 1-6; 1980 (16 references).

The renal clearance of 2,4-dichlorophenoxyacetate (2,4-D) was studied in the dogfish shark, *Squalus acanthias*. The clearance of total 2,4-D was more than 25 times greater then the glomerular filtration rate, which indicated that 2,4-D was secreted by the kidney. The secretion of total 2,4-D was decreased by bromocresol green, an inhibitor of organic anion secretion, which also produced a concurrent decrease in the glomerular filtration rate. As previously determined, 2,4-D was eliminated in the urine as the taurine conjugate (≈ 95% of the excretion products). The plasma of the dogfish shark, however, contained primarily unconjugated 2,4-D (≈ 90%) and only a minor amount of the taurine conjugate (≈ 5%). The limited amount of the taurine conjugate in the plasma cannot account for its urinary excretion. Apparently 2,4-D is transported into the renal tubular cell, after which 2,4-D is conjugated with taurine before elimination into the urine. (Author abstract by permission)

80-2070. Gil, D. L.; Ferreira, J.; Reynafarje, B. (Dep. Biochem., Fac. Med., North Univ. Chile, Santiago, Chile) **The 1,2,3-benzothiadiazoles. A new type of compound acting on coupling site I, in rat liver mitochondria.** *Xenobiotica* 10(1): 7-15; 1980 (17 references).

In rat liver mitochondria, 6-chloro-1,2,3-benzothiadizole (an insecticide synergist) inhibited ADP phosphorylation and Ca^{2+} transport when the energy required for these processes came from the oxidation of NAD-linked substrates. The inhibition was characterized by substantial reduction in oxygen consumption, H^+-movement and disappearance of acceptor control ratio. When the substrate oxidized was succinate, depending on the 6-chloro-1,2,3-benzothiadiazole concentration, little or

no effect was observed on ADP phosphorylation and Ca^{2+} transport. The results suggest that 6-chloro-1,2,3-benzothiadiazole can block site I at low concentrations, but at higher concentrations can affect site I and site II, although site I is always more affected. (Author abstract by permission)

80-2071. Singh, G. J. P.; Thornhill, R. A. (Dep. Zool. & Comp. Physiol., Univ. Birmingham, Birmingham B15 2TT, England) **Metabolic fate of ^{14}C dieldrin in *Schistocerca gregaria* with particular reference to the nervous system.** *Xenobiotica* 10(1): 57-63; 1980 (16 references).

In the metabolism of [^{14}C]dieldrin in *Schistocerca gregaria*, 4 metabolites of dieldrin were detected. Three of these have been identified as *cis*-aldrindiol, *trans*-aldrindiol and seco-aldrin dicarboxylic acid. Apart from the formation of *cis* and *trans*-aldrindiol, another metabolite, M1, was detected in the nervous system. The uptake of the dose of dieldrin was maximal in nerve cords followed by thoracic muscles and gut. Degradation of dieldrin was, however, not detected in thoracic muscles. (Author abstract by permission)

80-2072. Stein, K.; Portig, J.; Fuhrmann, H.; Koransky, W.; Noack, G. (Inst. Toxikol. & Pharmakol., Philipps Univ., D-3550 Marburg/Lahn, BRD) **Steric factors in the pharmacokinetics of lindane and α-hexachlorocyclohexane in rats.** *Xenobiotica* 10(1): 65-77; 1980 (24 references).

The elimination of α-1,2,3,4,5,5-hexachlorocyclohexane (α-HCH; BHC) by rats, as assessed by GLC determination of the chemical's diappearance from depot fat, exhibited a sex difference (males:females = 4:1) and a sizable deuterium isotope effect (6.3 in males). Lindane (γ-HCH), by contrast, disappeared from depot fat, skeletal muscle, brain and blood at nearly the same rates in both sexes. Perdeuteration, though effective in reducing hepatic removal, did not significantly retard the overall elimination of this isomer (isotope effect in males <2). Partial explanation of this finding is that lindane and lindane-d_6 are equally subject to dechlorination in the gut. α-HCH distributed into cerebral white matter in preference to grey matter to a much higher degree than did lindane and the β-isomer of HCH, and elimination from that tissue was slow. The finding is considered to indicate a stereoselective affinity of α-HCH to some component(s) of myelin. (Author abstract by permission)

See also 80-1802, 80-1803, 80-1806, 80-1807, 80-1808, 80-1809, 80-1811, 80-1814, 80-1840, 80-1841, 80-1845, 80-1847, 80-1848, 80-1850, 80-1853, 80-1854, 80-1855, 80-1856, 80-1857, 80-1862, 80-1863, 80-1864, 80-1865, 80-1866, 80-1867, 80-1868, 80-1883, 80-1899, 80-1907, 80-1911, 80-1954, 80-1955, 80-1961, 80-1962, 80-1965 *and* 80-2086.

80-2073. Horiba, M.; Takahashi, K. I.; Yamamoto, S.; Murano, A. (Inst. Biol. Sci., Sumitomo Chem. Co., Takatsukasa, Japan) **Gas chromatographic determination of optical isomers of acid moiety of fenvalerate (S-5602).** *Agric. Biol. Chem.* 44(2): 463-464; 1980 (9 references).

An analytical method is described for the determination of the optical isomers of the acid moiety of fenvalerate. Hydrogenolytic cleavage of the ester linkage of fenvalerate was carried out to liberate 2-(4-chlorophenol)isovaleric acid (CPIA) quantitatively. The resulting mixture was analyzed by programmed temperature gas chromatography and each peak characterized by gas chromatograph-mass spectrometer. The liberated CPIA was not reduced further, but was derivatized into its enantiomeric isopropylamide and determined on an optically active stationary phase, or derivatized into diastereoisomeric 1-menthyl ester and determined on an optically inactive phase silicone DC QF-1.

80-2074. Langhorst, M. L. (Michigan Div. Anal. Lab., Dow Chem. USA, Midland, MI 48640) **Solid adsorbent collection and gas chromatographic determination of the propylene glycol butyl ether esters of 2,4,5-T in air.** *Am. Ind. Hyg. Assoc. J.* 41(5): 328-333; 1980 (13 references).

A method has been developed and validated for the collection of the propylene glycol butyl ether esters of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in air and their determination by gas chromatography with electron capture detection. The samples are collected on XAD-2 resin and desorbed in diethyl ether prior to analysis. The procedure is designed for industrial hygiene monitoring to provide an accurate 4 hr time-weighted average of the exposure level. Recoveries were found to be 97 ± 8% (2 σ) for the propylene glycol butyl ether esters of 2,4,5-T in the concentration range of 0.70 ppb (v/v) to 5.00 ppm (v/v). Breakthrough concentrations, storage effects and humidity effects were also investigated. (Author abstract by permission)

80-2075. Higuchi, S.; Aiko, O.; Tanaka, S. (Dep. Ind. Chem., Fac. Eng., Univ. Tokyo, Tokyo, Japan) **Determination of trace amounts of some phenylamide pesticides by resonance Raman spectrometry.** *Anal. Chim. Acta* 116(1): 1-6; 1980 (12 references).

The resonance Raman spectrometric determination of 3-(4-chlorophenyl)-1,1-dimethylurea (monuron), 3-(3,4-dichlorophenyl)-1,1-dimethylurea (diuron), α-naphthylacetamide (NAD) and β-naphthylacetamide in water is described. These colorless samples exhibit no resonance Raman effect when an argon ion laser is used as excitation source, but when they are converted to azo dye derivatives (yields, 97 ± 1%), the resonance Raman spectra of the red products are analytically useful. Detection limits are $2\text{-}4 \times 10^{-6}$ *M*, and the analytical curves are linear up to 1×10^{-5} *M*. The analytical curve obtained by successive dilution of the most concentrated solution coincides with the curve for the products prepared separately at each concentration. The excellent selectivity of this method is demonstrated for structurally related samples and the possibility to their simultaneous determination is described. (Author abstract by permission)

80-2076. Copin, A.; Delmarcelle, J.; Deleu, R.; Renaud, A. (Dep. Chim. Anal., Fac. Sci. Agron. Etat, B-5800 Gembloux, Belgium) **Extraction et dosage par chromatographie en phase gazeuse d'un herbicide (neburon) et d'un de ses metabolites (3,4-dichloroaniline). Application a des eaux naturelles. [Extraction and gas chromatographic determination of a herbicide (neburon) and a metabolite (3,4-dichloroaniline). Application to natural waters.]** *Anal. Chim. Acta* 116(1): 145-152; 1980 (21 references) (French).

A method is reported for the simultaneous quantitative extraction of neburon (a urea herbicide) and 3,4-dichloroaniline (one of its metabolites) at residue levels (10-100 μg/l) in natural waters of various origins. The acetylation conditions described for 3,4-dichloroaniline permit gas chromatographic determination of neburon and of its metabolite. (Author abstract by permission)

80-2077. Narain, N. K.; Hanif, M.; Latheef, M. A.; Lewis, C. C. (Dep. Chem., Virginia State Univ., Petersburg, VA 23803) **Residues of acephate in three home garden vegetables.** *Anal. Lett.* 13(A3): 213-217; 1980 (5 references).

A gas chromatographic analysis method for acephate (Orthene) in vegetables is presented. Cabbage, garden bush bean and squash were sprayed with acephate formulated as 15.6% liquid at the rate of 4.0 g AI/l at weekly intervals, using a hand carried compression sprayer. Plants were sprayed to the point of run-off. Extracts from chopped vegetables were prepared for gas chromatographic analysis. The equipment used included a flame photometric detector, specific for HPE species, with a band emission at 520 nm. Clean up prior to injection into the gas chromatograph was not necessary. This reduced analysis time, solvent, chemicals and possible loss of acephate in the clean up procedure. Mean recovery values ranged from 85 to 90%.

80-2078. Bargnoux, H.; Pepin, D.; Chabard, J. L.; Vedrine, F.; Petit, J.; Berger, J. A. (Lab. Chim. Anal., Fac. Pharm., Inst. Hydrol., Univ. Clermont I, F-63001 Clermont-Ferrand Cedex, France) **Technique de preconcentration par lyophilisation applicable au dosage des pesticides organothiophosphores dans les eaux. [Preconcentration techniques by lyophilization applicable to determining the amounts of organothiophosphate**

pesticides in water.] *Analusis* 8(3): 117-118; 1980 (4 references) (French).

Lyophilization of organothiophosphate pesticides (parathion, malathion, dichlorvos, diazinon and ronnel) in water is used prior to quantitative analysis because the use of this technique prevents losses due to evaporation. While lyophilization stabilizes the samples and permits extended storage, it also yields concentrations suitable for quantitative analysis. Nitric acid (pH 4), lithium nitrate and bentonite are added to 1 ℓ water samples which are then congealed and lyophilized without heating in a 20-30 mm vacuum for 48 hr. Ethyl alcohol: petroleum ether (60 ml) are then used for subsequent gas chromatography of the lyophilisate. This size sample has a detection threshold of 0.3-2 μg/l which can be reduced to 0.01-0.03 μg/l if the 1 ℓ sample is brought down to 1 ml by heating.

80-2079. Self, R. (Food Res. Inst., Colney Land, Norwich, England) **Quantitative mass spectrometry: biomedical developments and food and agricultural applications.** *Ann. Chim. (Rome)* 70(1-11): 15-31; 1980 (88 references).

Recent publications dealing with the application of quantitative mass spectrometry to the measurement of trace components (including pesticides) in food and agricultural products are reviewed. The analytical strategy used in these applications is presented. Methods of presenting the findings in relation to accuracy, selectivity and sensitivity of various methods are discussed. It is suggested that there is a need to guard against errors and gain reproducibility of results.

80-2080. Miellet, A. (Lab. Agron., SICAGRO, F-45760 Olivet, France) **Dosage des residus de pesticides sur abeilles par chromatographie liquide a haute pression. [High-pressure liquid chromatographic determination of pesticide residues in honeybees.]** *Ann. Falsif. Expert. Chim.* 73(783): 81-83; 1980 (4 references) (French).

A method for the extraction, identification, and quantitative determination of pesticide residues in flowering plants and in honeybees is described. The residues are extracted from the plant material and honeybees with acetone, purified, and reextracted with chloroform. The residues are identified by known thin-layer chromatographic methods. High-pressure liquid chromatography is used for quantitative determination, using heptane-ethyl acetate as eluent.

80-2081. Specht, W.; Tillkes, M. (Lab. Rueckstandsanal., Hamburg, BRD) **Gaschromatographische Bestimmung von Rueckstaenden an Pflanzenbehandlungsmitteln nach Clean-up ueber Gelchromatographie und Mini-Kieselgel-Saeulenchromatographie. 1. Mitteilung: organochlor- Pflanzenbehandlungsmittel in Tabak und Tabakerzeugnissen. [Gas chromatographic determination of pesticide residues after cleanup by gel chromatography and mini silica gel column chromatography. Part 1. Organochlorine pesticides in tobacco and tobacco products.]** *Beitr. Tabakforsch.* 10(1): 73-79; 1979 (11 references) (German).

Automated gel permeation chromatography for the detection of organochlorine pesticide residues was carried out on tobacco samples spiked with 26 different pesticides. Gel chromatographic separation of the coextracted plant material was chosen over the routinely used column chromatography on Florisil to reduce losses of active substances. The sample with water was extracted with a quantity of acetone in 2:1 ratio of acetone:water. The extract was purified by gel permeation chromatography on polystyrene gel. Pesticides were recovered in a 65 ml eluate, which was again purified by chromatography on a 1 g column of deactivated silica gel. Two 10 ml fractions, free from contaminants, were collected. The detection limit was 0.002 mg/kg for β-BHC and 0.02 mg/kg for *p,p'*-DDT. Recovery of individual pesticides was between 90 and 100%. The method is also suitable for the extraction and purification of polar pesticides.

80-2082. Tadros, T. F. (ICI Plant Prot. Div., Jealott's Hill Res. Stn., Bracknell, Berk RG12 6EY, England) **Control and assessment of the physical stability of pesticidal suspension concentrates.** *Chem. Ind. (London)* (16): 211-218; 1980 (16 references).

A short summary of the techniques used for controlling the physical stability of pesticidal suspension concentrates is presented. Methods are described for the prevention of aggregation, the control of settling, and the use of thickners to increase the viscosity of the medium. The addition of inert solid fine particles can sometimes eliminate claying or caking. Bridging flocculation (the polymer chains act as links between the small clay or oxide particles) and controlled flocculation (the minimum depth can be controlled by varying the absorbed layer thickness in a given particulate system having a given particle radius) are described. Ostwald ripening and other procedures to control crystal growth are considered. Long term physical stability is often measured by rate of flocculation and crystal growth, and determinations of sediment volume and redispersion. Techniques for both dynamic and static measurements of small deformations and rheologic measurements at large deformations are discussed.

80-2083. Waliszewski, S.; Rzepczynski, M. (Inst. Pflanzenschutz, Poznan, Poland) **Bestimmung von Rueckstanden von Organochlorinsecticiden im Boden. I. Bestimmung von α β γ δ ε-HCH und HCB. [Determination of organochlorine insecticide residues in soil. I. Determination of α, β, γ, δ, ε-HCH and HCB.]** *Fresenius Z. Anal. Chem.* 301(1): 32; 1980 (German).

A method for the gas-chromatographic determination of residues of α-, β-, γ-, δ-, and ε-HCH (BHC) and HCB (hexachlorobenzene) in soil is described. Following ethyl acetate extraction, acid hydrolysis, and petroleum ether extraction, the residues are determined with an electron capture detector. The injection block temperature is 250°C, the column temperature 185°C, and the detector temperature is 250°C. Nitrogen is used as carrier gas. The recovery rate is 79-96% in the concentration range of 0.001-0.02 ppm. The detection limit is 0.0001-0.0004 ppm. The applicability of the method was also tested with aldrin, DDE, DDT, and DMDT, but sufficient recovery was obtained only for *o,p'*-DDT and *p,p'*-DDT (87 and 82%, respectively).

80-2084. Handa, S. K. (Div. Agric. Chem., Indian Agric. Res. Inst., New Delhi, India) **Spectrophotometric determination of carbofuran residues in water.** *J. Assoc. Off. Anal. Chem.* 63(2): 200-201; 1980 (10 references).

A spectrophotometric method has been developed for the microdetermination of carbofuran in water. The method is based on the reaction of carbofuran phenol (2,3-dihydro-2,2-dimethyl-7-hydroxy benzofuran) with nitric acid to form a colored compound with an absorption maximum at 345 nm. The method is applicable to residues in the range of 10-150 μg/ml solution. (Author abstract by permission)

80-2085. Veierov, D.; Aharonson, N. (Agric. Res. Organ., Volcani Cent., Bet Dagen, Israel) **Improved cleanup of large lipid samples for electron capture gas chromatographic quantitation and gas chromatographic-mass spectrometric confirmation of organochlorine residues.** *J. Assoc. Off. Anal. Chem.* 63(2): 202-207; 1980 (22 references).

A new cleanup method for large lipid samples is described for the analysis of organochlorine traces. The method allows both electron capture gas chromatographic (GC) quantitation of sub-ppb levels and confirmation by GC-mass spectrometry. The lipid is extracted with concentrated sulfuric acid from a 2-5% solution of light petroleum ether. The method has been scaled up without increasing the petroleum volume by the alternate addition of lipids and sulfuric acid. Recovery studies were performed with 11 common organochlorine contaminants spiked in butterfat and in vegetable oils at the ppb level. The method is characterized by low lipid carryover of 0.02% by minimal use of solvent (about 2-3 ml/g lipid), and by its simplicity. A 50-200 g sample can be cleaned up in one day. Five μg of incurred *p,p'*-DDE has been cleaned up from a 50 g butterfat sample and purified by one TLC run. The eluted compound was analyzed by GC-MS and showed one peak (flame photometric detector) with a mass spectrum identical to authentic *p,p'*-DDE. (Author abstract by permission)

80-2086. Krahn, M. M.; Brown, D. W.; Collier, T. K.; Friedman, A. J.; Jenkins, R. G.; Malins, D. C. (Environ. Conserv. Div., Northwest & Alaska Fish. Cent., Natl. Mar. Fish. Serv., Natl. Ocean. & Atmos. Adm., Seattle, WA 98112) **Rapid analysis of naphthalene and its metabolites in biological systems: determination by high-performance liquid chromatography/fluorescence detection and by plasma desorption/chemical ionization mass spectrometry.** *J. Biochem. Biophys. Methods* 2(4): 233-246; 1980 (21 references).

A rapid procedure is described for the analysis of naphthalene and its metabolites in mice and rainbow trout. Trout were fed either 0.4 or 4.0 mg naphthalene/day for 2 days and mice were injected ip with 3 mg naphthalene. Bile samples from each group of fish were pooled 24 hr after the second feeding and gallbladder bile was collected from the mice 18 hr after the injection. The method integrates high performance liquid chromatography (HPLC)/ultraviolet fluorescent (UVF) detection at 254 nm with plasma desorption (PD)/chemical ionization (CI) mass spectrometry (MS) for identification and quantitation of naphthalene and its metabolites in the bile. Reversed phase liquid chromatography was used first to separate the naphthalene from its metabolites and the integrated technique (HPLC/UVF, PD/CI MS) was then used for detection and quantification. A heat-labile metabolite, naphthyl glucuronide, was determined by using a modified direct insertion probe in an ionization mass spectrometer. The parent compound was detected (22 ± 2 ppm, wet wt.) only in the fish fed the higher dose. Minimum detectable quantities were estimated for confirmation by GC/MS. It was determined that the precision of the HPLC/UVF, PD/CI MS identification system was good and that the technique can be used for determining environmental contamination by other polyaromatic hydrocarbons. The system is particularly fast and applicable to examination of biological samples because the HPLC step requires little clean-up.

80-2087. Stanonis, D. J.; Rowland, S. P. (Southern Reg. Res. Cent., Agric. Res., SEA, USDA, New Orleans, LA 70179) **Distribution ratios and elution behavior of carbamates and polyhydroxy compounds from Sephadex G-15.** *J. Chromatogr.* 190(2): 448-451; 1980 (6 references).

The distribution ratios of several *n*-alkyl carbamates, sugars and vicinal polyols on Sephadex G-15 were determined by static batch experiments and then were correlated with their elution behavior in dynamic gel filtration on a Sephadex G-15 column. Equilibrium concentration of the solute from Sephadex supernatant liquid was determined by differential refractometry. A plot of mg solute in the gel phase/g of dry Sephadex as a function of the final equilibrium concentration of the solution in the supernatant was obtained, and D (the slope of the line representing that relationship) and A_w (the fraction of internal water available to the solute as solvent) were compared. Both D and A_w were found to decrease with increasing molecular weight of solute in the sugar series and the polyol series.

However, a significant difference in the relationship of D to A_m for sugars and polyols was also noted. From these results it was concluded that the equilibrium batch method for assessing penetration-sorption of solutes into the Sephadex gel provides a more sensitive procedure than dynamic gel filtration.

80-2088. Dufek, P.; Pacakova, V.*; Tesarova, E. (Dep. Anal. Chem., Fac. Sci., CS-128 40 Prague 2, Czechoslovakia) **Separation and behavior of *s*-triazine derivatives on a NH_2-chemically bonded stationary phase by high-performance liquid chromatography.** *J. Chromatogr.* 191: 115-120; 1980 (24 references).

The behavior of *s*-triazine derivatives on a NH_2-chemically bonded stationary phase was studied by high-performance liquid chromatography and their sorption mechanism was explained. Pentane and heptane mobile phases were selected, the polarity of which was increased by the addition of aliphatic alcohols (methanol, ethanol, isopropanol and *tert*-butanol). The NH_2-phase provides a better separation of *s*-triazines differing in the substituent at position 2 (methoxy-, chloro- and thiomethyl-*s*-triazines) compared with the formerly used chemically bonded CN- and reversed (C_{18}) phases. (Author abstract by permission)

80-2089. Paramasigamani, V.; Kapila, S.; Aue, W. A. (Dep. Chem., Dalhousie Univ., Halifax, Nova Scotia, Canada) **The gas chromatographic separation of some chlorinated hydrocarbon insecticides from PCB and PCN matrices.** *J. Chromatogr. Sci.* 18(4): 191-194; 1980 (6 references).

A gas chromatographic transfer technique was used to extract chlorinated hydrocarbon insecticides, such as aldrin, dieldrin, mirex, lindane and heptachlor epoxide, from polychlorinated biphenyls and naphthalenes. The sample was first injected into a nonpolar column. The appropriate fraction was later transferred by valve to a second polar column. In most cases the insecticides separated cleanly from the PCB or PCN matrix. The retention of dieldrin and heptachlor epoxide, both of which contain epoxy groups, differed from that of lindane, aldrin and mirex. The column combination chosen had a high thermal stability and a large difference in polarity.

80-2090. Voss, G. (Agric. Div., Giba-Geigy Ltd., Basle, Switzerland) **Cholinesterase autoanalysis: a rapid method for biochemical studies on susceptible and resistant insects.** *J. Econ. Entomol.* 73(2): 189-192; 1980 (10 references).

An automated enzyme assay, which combines ease and speed of operation with high accuracy and reproducibility, was used to investigate activities and inhibition properties of acetylcholinesterases from susceptible and resistant strains of *Spodoptera littoralis* Boisduval and *Musca domestica* L. The resistant races of both species were found to contain modified target enzymes characterized by increases in K_m and V_{max}, and by a decrease in sensitivity against organophosphorus and, to a lesser extent, carbamate insecticides. The different biochemical properties of acetylcholinesterases from susceptible and resistant individuals provide an opportunity for monitoring insect populations before, under, or after selection pressure for frequencies of genes associated with an insensitive target enzyme. (Author abstract by permission)

80-2091. Fuchsbichler, G. (Bayer Hauptversuchsanstalt Landwirtsch., D-8050 Freising 12, Weihenstephan, BRD) **Der Einsatz der automatischen Gelchromatographie zur Reinigung von Pesticidextrakten. [Use of automatic gel chromatography for clean up of pesticide extracts.]** *Landwirtsch. Forsch.* 32(3): 341-354; 1979 (11 references) (German).

The use of the automatic gel chromatograph Autoprep 1001 for the clean-up of pesticide extracts was investigated. The recovery rates and elution times of a pure test solution containing 15 organochlorine pesticides were determined. β-BHC and δ-BHC were eluted after approximately 90-100 ml, all others [α-BHC, γ-BHC, aldrin, heptachlor epoxide, γ-chlordane, α-chlordane, DDE, dieldrin, endrin, *o,p'*-DDT, *p,p'*-DDD (*p,p'*-TDE) and *p,p'*-DDT] between 130 and 210 ml. The recovery rates were between 90 and 110%. The recovery rates from feedstuffs were 59% for δ-BHC and 86.5-118.4% for the other pesticides.

80-2092. Rueckemann, V. H.; Goerner, A. (Stattl. Landwirtsch. Unters. & Forschungsanstalt, D-7500 Karlsruhe 41, BRD) **Bestimmung von Carbaryl in Spritzbruehen mittels Hochleistungsfluessigkeitschromatographie. [Determination of carbaryl in spray mixtures by high performance liquid chromatography.]** *Landwirtsch. Forsch.* 32(4): 425-429; 1979 (3 references) (German).

A method for determining the insecticide carbaryl (1-naphthyl-N-methylcarbamate) in spray mixtures by high performance liquid chromatography is described. The claim is made that it is faster and more accurate than the routinely used photometric method because it entails fewer analytical steps. The method is intended for determining carbaryl residues in feeds and foods. Carbaryl is extracted from the sample with *n*-hexane:dichloromethane (1:1), the solvents are evaporated, the residue is dissolved in a 9 + 1 mixture of *n*-heptane and isopropylalcohol and the solution is analyzed by high performance liquid chromatography. Reproducibility of the method is 94.7 to 100%. Other pesticides present in the sample do not interfere with the determination.

80-2093. Gordts, L.; Bertholet, Y.; Vandezande, A.; Van Haver, W. (Inst. Hyg. & Epidemiol., Dep. Pharmatoxicol., Food Div., Brussels, Belgium) **Determination of some organochlorine pesticides in the presence of toxaphene.** *Meded. Fac. Landbouwwet. Rijksuniv. Gent* 43(2): 1315-1320; 1978 (9 references).

Results of the use of column chromatography to determine lindane, dieldrin, and *p,p'*-DDT in a mixture containing toxaphene are presented. Two different types of columns were evaluated. The apparatus and chromatographic conditions are described, along with the preparation of the columns. Representative chromatographs are presented. The first column tested, which uses a mixture of silica gel and celite 545 as the absorbent, was found to be appropriate only for the determination of lindane. However, the second column, which uses a mixture of florisil, celite 545, sodium sulfate, attaclay and active carbon as the adsorbent, strongly retained toxaphene and gave satisfactory results, especially when using the eluting solvents 80% petroleum ether:20% acetone or 95% petroleum ether:5% acetone. Under these conditions, the organochlorine pesticides can be determined without difficulty when they are present in approximately equal amounts to toxaphene. When the toxaphene represents larger amounts, a fractional elution still permits the evaluation when the proportion lindane:dieldrin:toxaphene is 0.6% and 1.2% for *p,p'*-DDT.

80-2094. Engst, R.; Schnaak, W. (Zentralinst. Ernaehr., DDR-1505 Bergholz-Rehbruecke, DDR) **Zur Rueckstandsbestimmung des Fungizides Benzimidazolcarbamidsaeuremethylester und seiner Metabolite 2-Aminobenzimidazol und benzimidazol. [On the determination of residues of the fungicide benzimidazole carbamic acid methyl ester and its metabolites 2-amino-benzimidazole and benzimidazole.]** *Nahrung* 23(7): 701-706; 1979 (6 references) (German).

A method of extracting and determining the fungicide benzimidazole carbamic acid methylester (MBC; benomyl) from plant material in the presence of its metabolites 2-aminobenzimidazole and benzimidazole is described. Extraction by methanol was repeated several times at -20°C, and the combined extracts were evaporated to 2 ml. Purification with chloroform, hydrochloric acid, sodium hydroxide and finally with a mix of 100 ml methylene chloride and 100 ml acetone was followed by thin layer and paper chromatography using visual spot comparison. A sensitive biological method (fungus growth inhibition) for the detection of MBC was used. The metabolites were analyzed chemically. The detection threshold was 0.01 ppm MBC and about 0.2 ppm of the metabolites. The recovery rate was between 70 and 85%.

80-2095. Fukuhara, N.; Eto, M. (Dep. Agric. Chem., Kyushu Univ., Fukuoka 812, Japan) **Mass spectrometry of the insecticide Salithion and related cyclic phosphorus esters.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 63-68; 1980 (17 references).

Mass spectrometry studies were made of fifteen cyclic phosphorus esters including the insecticide Salithion, salioxon, MTBO derived from saligenin, 1-(5-chloro-2-hydroxyphenyl)ethanol, and 1,3-propanediols. All showed distinct molecular radical ions with considerable intensity. Ions were noted as base peaks in the phosphonate and phosphonothionate esters of saligenin, as moderate peaks in the phosphate, phosphorothionate, and phosphorothiolate esters and as relatively weak peaks in the propanediol derivatives. β-Cleavage of an exocyclic ester bond with charge retention on the phosphorus moiety in phosphate and phosphorothionate esters was noted. α-Cleavage is dominant in the thiolate esters. Thiono-type esters lose their SH group. Particularly in aryl phosphorothionates and thiono-thiolo rearrangement is noted. During the process of ester cleavage no proton rearrangement occurs.

80-2096. Kobayashi, H.; Matano, O.; Goto, S. (Inst. Environ. Toxicol., Kodaira, Tokyo 187, Japan) **Determination of rotenoids in soil and crops by high-performance liquid chromatography.** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 89-92; 1980 (5 references).

A method is described for the determination of 7 rotenoids (rotenone, *O*-demethylrotenone, dehydrorotenone, 8'-hydroxy-6aα, 12aα-rotenolone, 6aβ, 12aβ-rotenolone, 6aβ,12aα-rotenolone and 8'-hydroxyrotenone) in soil and crops using reversed-phase high pressure liquid chromatography. To monitor all compounds tested, the absorption at 294 nm was selected. After testing various columns, SC-02 was selected as the most suitable. A complete separation of the 7 rotenoids was obtained. Recoveries of rotenoids added to apples, tomatoes and soil were greater than 95%. Limits of detection were 0.02 to 0.08 ppm for all rotenoids studied.

80-2097. Onoda, Y.; Imamura, M. (Shizuoka Tea Exp. Stn., Kikugawa, Shizuoka 439, Japan) **[Utility of basic lead acetate treatment for analysis of pesticides residues in tea infusion.]** *Nippon Noyaku Gakkaishi (J. Pestic. Sci.)* 5(1): 101-105; 1980 (7 references) (Japanese).

A simplified method for the residual analysis of DMTP (fenthion) isoxathion, methomyl, PAP (phenthoate), phosalone and TPN (chlorothalonil) is presented. The method calls for basic lead acetate solutions to be added to the tea infusion to cause precipitation of polyphenols and saponins as lead complexes. These complexes are then filtered and washed. From the aqueous layer, all chemicals except methomyl were extracted and cleaned up. The first eluate contained isoxathion, the next contained DMTP and phosalone. Recovery ranged from 87 to 100% for DMTP, isoxathion, PAP, phosalone and TNP and 86% for methomyl. Lower limits of detection were 0.003 ppm for TPN, 0.03 ppm for methomyl and PAP, 0.04 ppm for DMTP, and 0.05 ppm for isoxathion and phosalone.

80-2098. Baluja, G.; Gonzalez, M. J. (Inst. Quim. Org. Gen., Madrid 2, Spain) **Contribucion al analisis residual simultaneo de compuestos inorganicos de mercurio por tecnicas cromatografico-espectroscopicas. [Contribution to the simultaneous residual analysis of inorganic and organic mercury compounds by chromatographic spectroscopic techniques.]** *Rev. Agroquim. Technol. Aliment.* 19(2): 270-278; 1979 (14 references) (Spanish).

The use of chromatographic-spectroscopic techniques for the simultaneous determination of organic and inorganic mercury compounds is discussed. Mercury mercaptides, mercury dithizonates, and *o*-, *m*- and *p*-tolyl derivatives of chloromethylenemercuryphenyl were intended to be fractionated and detected by gas-liquid chromatography with electron capture detector. Only the chloromethylene mercury derivatives gave satisfactory results in one of the columns of apolar phase of Apiezon L. Mercury dithizonates fractionated by TLC on silica gel were determined by flameless atomic absorption spectrophotometry of the spots previously burned in quartz tubes attached to a special device.

80-2099. Fogy, I.; Schmid, E. R.; Huber, J. F. K. (Inst. Anal. Chem., Univ. Wien, A-1090 Vienna, Austria) **Bestimmung von Carbamatpesticiden in Obst und Gemuse mittels mehrdimensionaler Hochdruckfluessigkeitschromatographie [Determination of carbamate pesticides in fruits and vegetables by multi-dimensional high pressure liquid chromatography.]** *Z. Lebensm. Unters. Forsch.* 170(3): 194-199; 1980 (6 references).

The use of multi-dimensional high pressure liquid chromatography to determine carbamate pesticides at the ppm level in extracts of fruits and vegetables is presented. The high separating power of this method requires a sample pretreatment consisting of only an extraction of the plant material with dichloromethane. The extraction solvent is then replaced by the mobile phase, and the sample is injected directly into the liquid chromatograph. Carbamates with a high capacity factor can be determined on a single chromatographic column. However, in samples where the effluent fraction of the first column is insufficiently separated from matrix compounds, the fraction can be transferred to a second column with another stationary phase by column-switching to complete the separation. The carbamate can be enriched by a suitable choice of size and position of the transferred fraction.

80-2100. Wtorkowska-Zaremba, A. (Inst. Gen. Chem., Tech. Univ., Lodz, Poland) **Metoda analizy dwutiokarbaminianow. [Determinations of dithiocarbamates.]** *Zesz. Nauk. Politech. Lodz. Chem.* 33(246): 45-55; 1977 (27 references) (Polish).

Titrimetric, colorimetric, and conductometric methods were studied concerning the determination of sodium dimethyldithiocarbamate (Dibam) and of the sum of ammonium ethylphenyldithiocarbamate, ammonium ethylphenylthiocarbamate, and ammonium dithiocarbamate. A photometric method is proposed for the determination of NaOH in sodium dimethyldithiocarbamate, and of NH_3 in ethylphenyldithiocarbamate. An indirect complexometric method is illustrated for the determination of ammonium ethylphenylthiocarbamate. Gravimetric determinations using copper dithiocarbamate dissolved in CCl_4 are also proposed for the determination of ammonium ethylphenyldithiocarbamate.

See also 80-1801, 80-1818, 80-1819, 80-1820, 80-1821, 80-1822, 80-1823, 80-1824, 80-1825, 80-1826, 80-1827, 80-1828, 80-1859, 80-1860, 80-1882, 80-1914, 80-1920, 80-1933, 80-1938 *and* 80-1942.

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